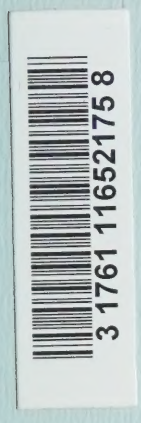

Ontario

ENVIRONMENTAL ASSESSMENT BOARD

VOLUME: 98

DATE: Wednesday, May 3rd, 1989

BEFORE: M.I. JEFFERY, Q.C., Chairman
E. MARTEL, Member
A. KOVEN, Member

FOR HEARING UPDATES CALL (TOLL-FREE): 1-800-387-8810

EARR & ASSOCIATES REPORTING INC.

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EA-87-02

HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental Assessment for Timber Management on Crown Lands in Ontario;

- and -

IN THE MATTER of an Order-in-Council (O.C. 2449/87) authorizing the Environmental Assessment Board to administer a funding program, in connection with the environmental assessment hearing with respect to the Timber Management Class Environmental Assessment, and to distribute funds to qualified participants.

Hearing held at the Ramada Prince Arthur Hotel, 17 North Cumberland St., Thunder Bay, Ontario, on Wednesday, May 3rd, 1989, commencing at 9:00 a.m.

VOLUME 98

BEFORE:

MR. MICHAEL I. JEFFERY, Q.C.	Chairman
MR. ELIE MARTEL	Member
MRS. ANNE KOVEN	Member

A P P E A R A N C E S

MR. V. FREIDIN, Q.C.) MS. C. BLASTORAH) MS. K. MURPHY) MS. Y. HERSCHER)	MINISTRY OF NATURAL RESOURCES
MR. B. CAMPBELL) MS. J. SEABORN)	MINISTRY OF ENVIRONMENT
MR. R. TUER, Q.C.) MR. R. COSMAN) MS. E. CRONK) MR. P.R. CASSIDY)	ONTARIO FOREST INDUSTRY ASSOCIATION and ONTARIO LUMBER MANUFACTURERS' ASSOCIATION
MR. J. WILLIAMS, Q.C. MR. B.R. ARMSTRONG MR. G.L. FIRMAN	ONTARIO FEDERATION OF ANGLERS & HUNTERS
MR. D. HUNTER	NISHNAWBE-ASKI NATION and WINDIGO TRIBAL COUNCIL
MR. J.F. CASTRILLI) MS. M. SWENARCHUK) MR. R. LINDGREN)	FORESTS FOR TOMORROW
MR. P. SANFORD) MS. L. NICHOLLS) MR. D. WOOD)	KIMBERLY-CLARK OF CANADA LIMITED and SPRUCE FALLS POWER & PAPER COMPANY
MR. D. MacDONALD	ONTARIO FEDERATION OF LABOUR
MR. R. COTTON	BOISE CASCADE OF CANADA LTD.
MR. Y. GERVAIS) MR. R. BARNES)	ONTARIO TRAPPERS ASSOCIATION
MR. R. EDWARDS) MR. B. McKERCHER)	NORTHERN ONTARIO TOURIST OUTFITTERS ASSOCIATION
MR. L. GREENSPOON) MS. B. LLOYD)	NORTHWATCH

APPEARANCES: (Cont'd)

MR. J.W. ERICKSON, Q.C.) MR. B. BABCOCK)	RED LAKE-EAR FALLS JOINT MUNICIPAL COMMITTEE
MR. D. SCOTT) MR. J.S. TAYLOR)	NORTHWESTERN ONTARIO ASSOCIATED CHAMBERS OF COMMERCE
MR. J.W. HARBELL) MR. S.M. MAKUCH)	GREAT LAKES FOREST
MR. J. EBBS	ONTARIO PROFESSIONAL FORESTERS ASSOCIATION
MR. D. KING	VENTURE TOURISM ASSOCIATION OF ONTARIO
MR. D. COLBORNE	GRAND COUNCIL TREATY #3
MR. R. REILLY	ONTARIO METIS & ABORIGINAL ASSOCIATION
MR. H. GRAHAM	CANADIAN INSTITUTE OF FORESTRY (CENTRAL ONTARIO SECTION)
MR. G.J. KINLIN	DEPARTMENT OF JUSTICE
MR. S.J. STEPINAC	MINISTRY OF NORTHERN DEVELOPMENT & MINES
MR. M. COATES	ONTARIO FORESTRY ASSOCIATION
MR. P. ODORIZZI	BEARDMORE-LAKE NIPIGON WATCHDOG SOCIETY
MR. R.L. AXFORD	CANADIAN ASSOCIATION OF SINGLE INDUSTRY TOWNS
MR. M.O. EDWARDS	FORT FRANCES CHAMBER OF COMMERCE
MR. P.D. McCUTCHEON	GEORGE NIXON

APPEARANCES: (Cont'd)

MR. C. BRUNETTA	NORTHWESTERN ONTARIO TOURISM ASSOCIATION

I N D E X O F P R O C E E D I N G S

I N D E X O F E X H I B I T S

Index of Exhibits (Cont'd)

---Upon commencing at 9:25 a.m.

THE CHAIRMAN: Good morning. Be seated, please.

Ms. Blastorah?

MS. BLASTORAH: Mr. Chairman, just before we begin I would like to ask that we break just before twelve o'clock today. Some members of the panel have a meeting they have to go to and it would be helpful if we could do that and just have the regular length of lunch but just maybe a half hour earlier.

THE CHAIRMAN: Very well.

MS. BLASTORAH: Thank you.

JOHN TRUMAN ALLIN,
PETER PHILLIP HYNARD,
RICHARD BRUCE GREENWOOD,
CAMERON D. CLARK,
FRANK D. KENNEDY,
WILLIAM DOUGLAS BAKER,
ROBERT ELLIOTT,
RONALD ORVAL WAITO,
DAVID M. HOGG, Resumed

CONTINUED DIRECT EXAMINATION BY MS. BLASTORAH:

Q. Mr. Hynard, before we go on to some new evidence today, I would like to go back to yesterday's evidence for just a few minutes and, in particular, to your third main message, that was the untreated areas do regenerate naturally, albeit primarily to commercially non-preferred species.

Could you please put up Exhibit 534A on

the overhead.

Just looking at this graph, could the area which you referred to as untreated, the white zone on the graph, include the regeneration of commercially preferred species?

MR HYNARD: A. Well, yes it can and it certainly does. Undoubtedly some regeneration of commercially preferred species like pine and spruce would occur within those areas. It would occur just naturally without assistance by man.

Q. Would you please define what you mean by commercially preferred and non-preferred species?

A. Well, let me start by defining what I mean by a commercial species. A Commercial species would include any species for which there is -- any species which have commercial value and for which there is a market demand. So virtually all of the principal tree species in Ontario would be commercial tree species.

By commercially preferred species, these are tree species for which there is a market demand and those market demands may be universal or at least province-wide in the sense that a strong market demand exists for them right across the area of the undertaking and I am thinking there of species like

pine and spruce.

Q. So, Mr. Hynard, just before you go on I am not sure I understood the distinction you made there because you indicated that commercial species are species which have a market demand, and then you also indicated that commercially preferred species are species which have a market demand. Is there some distinction between the type of market demand?

A. Yes, absolutely. When I say commercially preferred, I mean that in that particular locale there is a market demand for that species. Commercial tree species have a market demand somewhere but not necessarily everywhere.

When I say it's commercially preferred, I mean that there is a demand for that species in that particular locale. So, for example, some species like pine and spruce, for example, have virtually universal market demand across Ontario; other species like poplar may have a strong demand in a particular locale but not in others.

Commercially non-preferred species then would include all the other commercial species. There is a demand for them somewhere, but not in that particular locale. So that doesn't mean that a non-preferred species is non-useable or it will not be

useable at the time of its maturity, it simply means that it is not preferred.

Q. Would you please relate this back to some of the examples that you used in your evidence yesterday?

A. Well, yesterday I used the example of poplar, and poplar is a real good example of this. It's obviously a commercial species, market demand exists for it in Ontario. On some management units it's in strong demand, I'm thinking of management units in the Timmins area Thunder Bay where poplar is a marketable item and is in demand. So it would there be commercially preferred.

In other locale on other management units it may be non-preferred. So this question of preference really relates to management objectives and the statement of preference would occur in the silvicultural groundrules as the proposed working group.

There is no doubt that market demand changes over time and species preference too will change over time. History certainly has shown that to us and poplar again is a very good example of that. It has increased -- the market consumption of poplar has increased 70 per cent in the last four years alone and

that would be a trend that I would expect to continue. And as those market demands and species preference change over time, then management objectives will also.

Q. And how does that relate to the graph which is Exhibit 534A?

A. Well, what that means is the area in white at the top of the graph is an area that is regenerating primarily to non-preferred species; that is, species for which there is no current strong market demand in that particular locale. This is a provincial graph and it's an aggregate of all the management units across Ontario.

So that if a species such as poplar, for example, on a unit where it is a commercially preferred species and the management objective is natural regeneration on some sites, it would appear in the green category. On other management units where it is a non-preferred species and cuts that are left untreated are being allowed to regenerate to poplar, they would appear in this category here.

So that the graph is really an aggregate of all the Crown lands across Ontario. Some areas the same -- in one area the species may be preferred and in another area the same species non-preferred.

Q. Should more regeneration of

commercially preferred species occur in this white zone on Exhibit 534A?

A. Well, as a practising forester that is certainly my desire but really that question is a provincial question and I am not in a position to provide that provincial answer.

The question of the adequacy of Ontario's regeneration program was addressed in Panel 4 by Dr. Osborn and Dave Gordon and I would have to refer you back to that evidence.

But looking back at my description of this particular graph yesterday, and I would just like to reiterate that as market demand changes and as species preference change and as management objectives change, lands which are presently classed in this white area; that is, being allowed to regenerate naturally to non-preferred species, more and more of those areas will move down into this green area as species preference change.

Once a market has been established in an area and there is a demand for a certain volume of, for example, poplar it becomes an objective to grow that quantity of poplar. And silvicultural groundrules would reflect that on certain site types there would be a statement that poplar was the proposed working group

and the area would be recorded as natural regeneration to preferred species in that other category.

Q. So if I can just sum up, Mr. Hynard, to make sure I understand what you have just explained to us. The area in white may well contain commercial tree species which are simply not preferred in the locales in which they are growing and, therefore, they are located in the white area because they are not going toward meeting the management objectives for that particular locale.

On another locale they might well have been placed in the green area because they would be working towards that objective?

A. Yes, that's right, for that particular species, although I wouldn't say that it was not necessarily working towards the objective on the management units. That objective might be a stated volume of wood which is being attained by regeneration in those other categories.

Q. So that remark should be limited to objectives for that species?

A. That's right.

Q. Thank you. I believe when we finished yesterday we were about to move on to the area of past results in your evidence.

A. That's right. Past results was the last of those five factors influencing the regeneration method and back in Panel 10 I stated that past results do influence silvicultural decisions. I also said that we don't have a computerized adaptive management model that contains all of the various input factors like treatments and success rates by site type and treatment type that is constantly being updated with those results. In fact, I recall mentioning that I doubted whether such a model even existed or had wide-spread use in diagnostic medicine. Certainly we don't have a model like that that we use in establishing past results.

Q. How then do you take -- how then do past results influence renewal decisions?

A. Well, there are three ways in which we take past results into count. The first way is the formalized regeneration assessments that you heard about in Panel 4 and these are conducted on areas that have been selected for assessment by the unit forester.

The second way that we use or learn from past results is by foresters and their staff visiting and revisiting their treatment areas, their projects over time. It's certainly one of the most important ways that I have learned forestry over the years,

watching changes over time on areas that I have treated and, of course, areas that my predecessor treated also.

The third way that we learn past results is from our colleagues. Any time that a forester wants to know more about a treatment type on a particular site type, the first thing he does is phone around.

The forestry community is a small one, there's a lot of knowledge word of mouth of who is doing what, and a simple phone call allows you to learn right away what has been tried, what has been used by treatment type and site type.

Once you have located an area that is of interest to you that you want to learn about those past results, it's real easy to arrange a visit and that's very common too, to go and visit that area and learn the results from that treatment type on that site type so that you can use that kind of information in influencing or determining your own silvicultural prescriptions. And I recall back in Panel 10 giving an example of just that.

The Forests for Tomorrow posed an interrogatory to us asking for renewal results for eight different districts by working group, silvicultural harvest system and regeneration method. Now, we are certain that renewal results will be of

interest to the Board also and we will be filing that interrogatory and its results later on when Mr. Waito is presenting his evidence along with an analysis of those results and what the numbers mean.

Because my on unit was one of those units chosen, I would like to file the Minden results and my analysis of those results at this time.

MS. BLASTORAH: Mr. Chairman, perhaps we can do that now, mark that as the next exhibit. We have a package of information. The reference is Forests for Tomorrow Interrogatory No. 15 and perhaps we could mark this one Minden results just to distinguish it from the later exhibit.

THE CHAIRMAN: Very well, Exhibit 540.

---EXHIBIT NO. 540: Forests for Tomorrow Interrogatory Question No. 15, Minden results.

MR. HYNARD: The reason that I would like to do that --

MS. BLASTORAH: Q. Sorry, Mr. Hynard, I think we are ready.

MR. HYNARD: A. The reason that I would like to do that is to show two things. First of all, that past results are taken into account in determining silvicultural decisions and, secondly, it shows how they are taken into account.

The second reason for doing that is to point out that you simply cannot add numbers. If you simply add numbers, it may lead you to the wrong conclusion. You have to carry out a thoughtful and careful analysis of those numbers and what they mean.

Q. Mr. Hynard, I think you were going to take us through some of the highlights of this.

A. I don't think it's necessary to do that at this point. For those parties who have an interest in how that's done, I think probably the exhibit itself will do that, but what's important is to understand that past results are taken into account and how they are and, secondly, that you can't simply add numbers up. There's more to it than that alone.

Q. Okay, thank you. And the interrogatory I think has been highlighted in some areas that Mr. Hynard wanted to draw to our particular attention.

MR. HYNARD: A. That's right. Just for your own ease in tracking through all that paper looking for pieces of information that do relate to past results.

What I would like to do now is run through a series of slides showing Ontario applications of natural regeneration methods. So if I could get a

volunteer to dim the lights, we will turn on the slide show.

THE CHAIRMAN: Ms. Blastorah, how are we going to handle this group of slides? Do you have hard copies of the slides, or --

MS. BLASTORAH: We will be providing hard copies. These are all slides that are contained in the witness statement and as we go through we will give the photo number as it's indicated in the witness statement. For instance, 1.1, 1.2 and so on.

THE CHAIRMAN: Yes. So I think overall the package we will make Exhibit 541.

MS. BLASTORAH: Thank you, Mr. Chairman.

THE CHAIRMAN: Which will then refer to the hard copies when we get them. And then under 541, I guess we can refer to the number that corresponds with the witness statement.

MS. BLASTORAH: Yes. Perhaps we will just mark that on the record. Since they are already clearly indicated in the witness statement, I think if we just indicate on the record which photo we are talking about that should be clear.

---EXHIBIT NO. 541: Package of hard copies of slides referred to in Statement of Evidence for Panel No. 11.

MR. HYNARD: The way these photographs

are arranged is by species beginning with black spruce and working through the principal tree species in Ontario that are regenerated by natural means.

And I can't see well from this corner, but if you would tell me any time it's not focussed properly.

MS. BLASTORAH: Mr. Hynard, would it be any easier for you if you moved your chair out to this table here?

MR. HYNARD: I think I'm all right from here.

MS. BLASTORAH: Okay.

THE CHAIRMAN: So are you starting on page 192 with 1.1?

MS. BLASTORAH: That's correct, Mr. Chairman.

MR. HYNARD: And I will read out the photo numbers for each one as they come up.

MS. SWENARCHUK: 1.4, isn't it?

MS. BLASTORAH: I beg your pardon you have got Mr. Waito's photos, Mr. Chairman.

MR. HYNARD: This is photo 1.1.

MR. CASSIDY: Page 124 in Volume I.

MS. BLASTORAH: For the record, it's page 124 of Exhibit 532A.

MR. HYNARD: Well, this is black spruce. This is a picture of a two or three year old seedling somewhere in Kennedy Township in Cochrane District. Black spruce is a prolific seeder, it has seed crops about every four years. The cones are semi-serotinous which means that some of the cones remain on the tree and the seed remains viable within the cone and it's released over time.

That is one factor that gives a more continuous seed release to black spruce than you would otherwise expect from a periodic seeder.

The preferred seedbed for black spruce, while it likes a most mineral soil, it also likes most compacted mosses, and living spagnum moss like this are preferred seedbeds for black spruce.

As you can see from this, it looks to me like about a three year old tree, they are very, very slow starters and the fact that they start so slow is a trait that makes them competition prone.

You recall from my evidence yesterday that one of the silvical characteristics that is important in determining a regeneration method is its relative competitive ability in comparison to it's associates. On this particular site type it does not have strong competitors associated with it. So natural

regeneration methods are possible on lowland, poorly drained areas with suitable seedbeds. The same species on a different site, one that is more competition prone, would not prove so successful.

The regeneration like this can be secured by natural seeding on the site type and, in some cases, an inadequate seedbed can be improved by mechanical site preparation.

MS. BLASTORAH: Q. Could you back up just for a minute, Mr. Hynard. It's difficult to tell without anything to relate it to how large that seedling is. Could you give us an idea?

MR. HYNARD: A. Well, I would guess it to be in the order of 6 or 7 inches.

Q. And that's a three year old?

A. I'm guessing, I took a look at it last night. I would think that's a three year old. There is another young one, I can't see it from here myself, but it's right in this area here. Can you see a second tiny little spruce down here?

Q. Perhaps you could focus it a little better, I know it's difficult for you to see.

A. There it is right there. (indicating) Looks like another another one right here too. (indicating)

Q. You also indicated that an inadequate seedbed could sometimes be improved by site preparation. Were you thinking of some particular type of site presentation for a site like this?

A. On a site like this, yes, shear blading, mechanical site presentation. One of its preferred seedbeds is compacted mosses and that is the intent of shear blading. In fact, on this next picture Which is photo 1.2 in the statement of evidence, you will recall this picture, this picture was used in Panel 10 as an example of block clear cuts and Mrs. Koven, I pointed out to you the striations in some of those blocks.

This one here in particular, if you look very closely, you will see striations up and down within it and that is evidence of the mechanical site preparation, the shear blading which occurred there. I know it's not possible to see it from the back of the room at all.

This picture was taken in 1976 I believe, it's -- the size of the blocks you will recall was about 200 metres by 200 metres which makes them 4 hectares each which is relatively small for a block. This is photograph 1.3.

Q. Mr. Hynard, I'm sorry, just before

you go on. On the first -- the first little seedling that you showed us and then you indicated that you started talking about block cuts. Would block cuts be the type of cutting method that would be used to produce natural regeneration on this site type?

A. They could be. One of the techniques used for natural methods -- well, there are essentially two methods used on this particular site type and by the site type I'm referring generally to lowland poorly drained areas with suitable seedbeds.

And the two methods for black spruce naturals that are used are normally strip clearcutting and group seed tree cutting. Either method can be used successfully on this particular site type.

In the case of photo 1.2 the blocks are square rather than rectangular strips which is not particularly important with regard to regeneration, but you recall from Panel 10 that it does have great importance with respect to blowdown and the size of the blocks, the amount of perimeter edge in comparison to the area being harvested were all factors affecting degree of blowdown, at least they were some of the factors affecting blowdown.

So in the case of photograph 1.2, we have a lot of edge for the size of the cut and we would

expect perhaps that this would be more susceptible to blowdown than an arrangement of rectangular strips.

Q. And, as I recall, black spruce is a species that is particularly susceptible to blowdown?

A. Well, it is. I don't know in this particular case, the structure of the stand, the nature of the stand and the site which are again all other factors which affect vulnerability to blowdown also.

This is photograph 1.3 and here we are on the ground in one of those blocks. You can see the corner of the leave block behind you. If you look closely you will also see the regeneration, the black spruce regeneration in front of these two people and in the background you will see that there is some alder competition on that site.

And alder is common on that site type or at least some of those site types. The forester who took the picture, Tony Paradiso informed me that the blocks ranged between 70 and 90 per cent stocking, nine years after -- sorry, five years after cutting. This particular picture was taken nine years after cutting.

Q. That is the first harvest cut; is it, of the blocks -- the original blocks?

A. That's right, the original first cut. And he informs me also that the second cut, the return

cut for the leave blocks is now underway.

Q. Did you indicate what year the original cut was and what year this photograph was taken?

A. I believe the original cut was 1976 or the original treatment, and this picture was taken in 1986, nine years later.

This is photograph 1.4 and back in Panel 10 you heard considerable talk of black spruce layering. Layering is a method of natural regeneration in which the lower branches of trees that are in contact with the ground root themselves and after they have established a root, the tip of that branch turns upward to form a normal tree stem and that is what you are looking at.

You can see the original branch right here (indicating), you can see the rooting that has occurred off that branch, and you can see that the branch tip has turned upwards and is now producing what appears to be a normal tree, in fact it will be a normal tree.

That question was asked in an interrogatory: Is the quality -- is a tree that is produced from a layer equal in form and performance and quality to a normal tree of seed origin. And the

answer to that is, yes, they certainly can be. Any layer that exhibits good health and vigor will produce a normal tree.

Q. Is this the type of advanced growth we saw in the photos that Mr. Oldford used in Panel 10 when he was talking about using the CLAAG or careful logging around advanced growth method of harvest?

A. Yes, yes, exactly.

Q. This is a black spruce; is it?

A. That's a black spruce. Black spruce is the only Ontario tree species that regenerates in this fashion to any significant degree.

This is photograph 1.5. It's an understorey of black spruce advanced reproduction which is composed largely of trees of layering origin and you can see that in this picture here there is a considerable amount of advanced reproduction of that type.

Layerings -- layers themselves will layer. In other words, a tree that has originated in that fashion will it too have its branches in contact with the ground and if it's moist mosses that overgrow that branch in contact with the ground, then just a perfect environment for that branch to root itself. And so the layer has itself layered and that tree may

subsequently layer also.

What this means, when you look at the nature of advanced reproduction from black spruce layerings is that they are often spotty in nature. That portions of the stand may be adequately stocked to advanced reproduction of this type and other areas in between less so.

And the reason for that is that layerings themselves layer and tend to fill up some areas where they exist and not necessarily uniformly throughout the stand.

So the question that occurs in the forester's mind: Is there sufficient advanced reproduction to restock the stand to the standards specified in the groundrules. And you will recall from the Red Lake plan that Mr. Hanna went through with me, Table 4.11.3 I believe it was, that was one of the criteria upon which he based his prescriptions, the adequacy of advanced reproduction.

Q. You indicated that layers can themselves layer. Would there be a certain age that the tree would have to be before it could do that, or just large enough to have branches in contact with the ground?

A. Yes, that's the basis of it. It has

to be large enough that it has branches spreading out that are in contact with the ground. This habit is site related also. It's site related in a couple of ways.

First of all, the trees must have lower branches near the ground. On very productive sites, stocking levels including other species tend to force earlier self-pruning in trees and a tree which has self-pruned itself doesn't have branches on its lower bole, it doesn't have branches in contact with the ground that can root in this fashion.

Similarly, on that kind of a site it may not have a suitable seedbed like a moist spagnum seedbed, it certainly wouldn't on an upland productive site. So that we cannot establish a natural by seed which can then start the layering habit. So that the presence of layerings in numbers sufficient to restock a stand is very, very much site related.

This is photograph 1.6 and it is another picture from Panel 10. It is showing a fresh clearcut in a black spruce stand using what was described to you as the CLAAG approach, careful logging around advanced growth.

What we are looking down here is the main skid trail. Mr. Oldford described to you the

mechanical harvesting operations using wide-tired feller-forwarders in which the feller-forwarder reached into the uncut strip and harvested the trees and lifted them out and onto its back and then proceeded down this skid trail. He described the reach of that particular machine as about 20 feet, so that means there is about a 40-foot strip of relatively low disturbance for each one of these trails.

This is photograph 1.7 and this photograph was taken within one of the strips four years following cutting and you can see that there is a considerable amount of advanced growth -- black spruce advanced growth from layerings. You will notice that there are also quite a few residuals left standing and that was apparent in the fresh cut-over in the previous photograph also. These are small undersized trees. Part of that approach is to simply leave the small trees because they too might contribute and contribute further seed source.

I mentioned to you that the degree of advanced reproduction can vary and, in fact, while it may be present in some stands, it may not be sufficient to restock the stand to the standards that are specified in the groundrules.

And you heard about the approach called

HARO, you heard about it some yesterday. It's simply -- or at least the approach behind it is simply one of combining artificial and natural methods; natural being to protect the advanced reproduction wherever it occurs, and the artificial being to infill by planting following the harvest so the area is satisfactorily restocked.

We are going to move on now to jack pine. These three trees are fresh jack pine germinates and these are the type that will appear naturally following scarification on deep, relatively silt-free sands, or on variable depth but generally very shallow sandy tills over rock.

I'm going to qualify that a little further. It has to be on one of those two site types. In addition, it has to be west of Manitouwadge. Somehow Manitouwadge has been found to be the line where it works to the west of there and then not as well to the east. It's simply climatic differences related to rainfall.

I'm going to qualify it further by saying that there must be sufficient seed source in the harvest slash. Jack pine is a periodic seeder also, but it produces a serotinous cone. The cone remains firmly closed and on the tree and the seed remains in

that cone and can remain viable for up to 15 years after that cone has been produced and, of course, there are continually new seed crops and new cones that remain on that tree too.

The purpose of all that for jack pine is to have a ready available seed source for wild fire. The cone is serotinous, it requires high temperatures to open. Once it's open, it quickly releases its seed and it's a trait that has evolved with jack pine to give it a competitive edge following wild fire. It has a ready abundant seed source waiting for that fire.

Q. Would these be cones left in the slash?

A. Yes, that's what you're looking at and you can see that those particular cones have opened.

Q. I beg your pardon, Mr. Hynard. What will have caused those cones to open, the ones that were left in the slash?

A. The reason that they have opened here on the ground is high temperatures. On this particular site type, using a clearcut logging method or logging system we've got the hot sun beating down on the ground and it's producing high ground temperatures, particularly on this site type which is relatively dry

because of its drainage and those high temperatures cause the cones to open.

I recall somewhere Mr. Greenwood being asked the question about the effects of clearcuts on micro-climate and this is an example. I think he used this example of such an effect and, in this case, it's one that's very, very useful.

If the site was different -- why does this only work on this site type. If the site was different, if it had more fine content in the soil, if it had a better moisture availability, it wouldn't be bare ground like this, it would have an understorey of shrubs and it would have natural regeneration of other species very, very quickly after the cut. That would change all of that, it would change the seedbed, it would change the temperature and it would change the relative competitive ability.

So that we are really confined to a narrow range of site types here. We are further confined by the logging method. If the area has been logged using the full-tree method, then the cones will not be present in the harvest slash on the ground, at least not to the same degree. It's true some top breakage occurs and there will be some cones, but not to the same degree.

So that if the area has been logged using the full-tree method, then supplementary seeding will be necessary and such a treatment would then be categorized as an artificial method.

This type of regeneration requires some assistance in the form of scarification to produce a mineral soil seedbed.

Q. That would be even where the seed were from cones in the slash as opposed to where you had direct seeded?

A. Yes, in either case it still needs that seedbed. This is photograph 2.2. It is a young jack pine stand six years following clearcutting and scarification and that's just exactly what it looks like.

Q. Could you just back up to that one for a minute, Mr. Hynard?

A. Yes.

Q. What site type is that?

A. Well, I haven't been there and I'm not sure.

Q. Okay.

A. But it would be one of those categories. I mean, that flat sort of expanse there suggests to me that we are looking at a waterlaid sand,

so I would take a wild guess at a relatively silt-free sand, waterlaid glaciofluvial sand, but I haven't been to that site.

Q. Thank you.

A. This is photograph 2.3 and in that photograph you can see a black spruce seedling here -- or I'm sorry, a jack pine seedling and you can see a number of others which have regenerated also and have been cut. You are looking at the result actually of a tending project and you will see this photograph again in Panel 12 talking about tending.

The point here is that excessive density of jack pipe regeneration may result from wild fires and it may result too from scarification for natural jack pine where the area has been over-prepared, over site prep'd or, in the case of seeding, where the area has been over-seeded.

You will recall I think somewhere someone has said that the advantages of tree planting are with respect, at least some of the advantages, to the spacing of the trees. When you go for natural regeneration, you accept whatever spacing those naturals volunteer themselves. If we go back to the first jack pine picture, photograph 2.1, you can see that these trees are not perfectly spaced, they are

randomly spaced or at least randomly spaced within the acceptable seedbed.

One of the factors influencing regeneration methods was economics, the economics of the alternatives. If we are comparing planting on this site type with scarification for natural or site prep plus seeding, we have to look at the comparable results. In the one case, the planting is going to get a much better uniformity of spacing than the naturals or the seeding will. The naturals and the seeding, of course, are much cheaper.

If your objective is to grow saw logs and if your objective is to keep a really highly productive site highly productive, then you want to have your trees spaced. If, under some circumstances, that requires a spacing treatment, such as we are looking at here, then those costs have to be figured into the comparison.

Yesterday I said that the big advantage of natural regeneration is its low cost. Well, usually that's true, but not always. If it required a spacing operation to give you the equivalent end product, natural might in fact cost you more. So those are other factors that influence the choice.

Moving on now to poplar, and by poplar I

am including large tooth aspen and trembling aspen. Trembling aspen occurs right across the area of the undertaking, large tooth aspen only occurs within the Great Lakes/St. Lawrence Forest. But they are very, very similar in silvical characteristics and their wood properties are actually identical.

Q. This is photograph 3.1 in the witness statement?

A. 3.1. What we are looking at here is vegetative reproduction. Both poplars will sucker tremendously from the root system and this is a root that we are looking at right here that has been pulled out of the ground so that you can observe this habit. Here we are here, that's the root (indicating) and suckering has occurred from adventitious bugs along that root.

Here is where the point of suckering is and you can see that there have been several stems originate at this one point. It is the high soil temperatures that induce suckering. So a clearcut system that allows the sunlight to shine on the ground, warms up the soil and induces suckering. There are other factors too. Root disturbance will cause more suckering.

At any rate, on normal sites where poplar

occurs you can get a tremendous amount of suckering and a stand that has no more than a 30 per cent poplar content can be fully stocked following clearcut and regeneration by these methods, and the number of stems can range up to 50,000 per hectare in the first year.

Not only is it cheap and easy, it works every time. These trees are, in addition, fast starters. It is easy for them to make one metre in their first year and I have even seen large tooth make two metres in its first year. The reason that it can make such a fast start is that it's getting the boost of all the carbohydrate reserves that are stored in the parent stump and -- sorry, root system.

Q. On that last slide, you don't need to go back to it necessarily, but you indicated that high ground temperatures would be necessary or would encourage suckering?

A. Yes.

Q. When would you have that occur?

A. Well, those higher soil temperatures occur in the summertime. The suckering in clearcut stands, normally if the stand was clearcut in the previous winter, the sprouts would be starting to emerge on my unit in late June, early July. It is that time before you see the suckers appearing.

If, on the other hand, the stand is cut during the course of the summer, then the suckering will occur later in that year and there will be subsequent suckering the following year. It is very normal for suckering to occur over not just one but several years, two, three tops, is when you see the suckering occurring.

Now, some of the factors that influence the degree and vigor of suckering is season of harvest. For example, winter cuts have the reputation of producing more copus and more vigorous copus for the simple reason that there is more stored carbohydrate in the root system in the wintertime.

Similarly, cuts that leave very little slash behind have the reputation for producing better poplar regeneration than those that leave a great amount of slash behind, and the simple reason is that you get more sun on the ground, you get higher temperatures sooner. My own experience is that regardless of the season of harvest and regardless of the degree of slash that's left behind, poplar stands treated in this fashion always regenerate satisfactorily.

Q. Thank you.

A. This is photograph 3.2, and you saw

this picture in Panel 10 also, it is from the Elk Lake unit near Kirkland Lake. It is a young trembling aspen stand ten years following clearcutting, and this is an area in which poplar is a commercially preferred species and it is the intended or proposed working group on the silvicultural groundrules for certain site types, at least on the Plonski forest with which I am familiar, I haven't been on the Elk Lake unit and I haven't been to this particular location.

This next photograph, photograph 3.3, is the same stand as it looks on the ground. So that's trembling aspen, natural regeneration by vegetative methods ten years following cutting.

One of the questions that appeared in an interrogatory was: Are sucker origin stands equal in quality to trees of seed origin, and the answer to that is: Yes, they are equal and sometimes superior. They are at least equal because most of the poplar stands that we have are themselves of sucker origin. That's how they regenerated themselves naturally.

I say sometimes superior because certainly my experience on my unit is that regeneration of this kind of density forces very early self-pruning. The lower branches are shaded and they fall off at a very young age in small size and that leaves fewer

entry points for decay.

Poplar stands, poplar is a great self-thinner. You might wonder how a stand of this kind of density will ever grow to maturity because of the numbers of trees, especially after what I told you about with regard to jack pine. Well, jack pine is a species which does not thin itself well, at least under some conditions it doesn't, and stands may stagnate as a result of excessive density.

In the case of poplar, that's not true. Poplar is a good self-thinner and stands do not stagnate. Some trees show early dominance and the trees that are -- their neighbours that are suppressed drop out of the stand. Although, of course, it affects diameter increment during that process, but you will hear more of that in Panel 12.

This is photograph 3.4. It is the corner of a six-year-old large tooth aspen stand that has grown up following clearcutting, and this is from my own unit down in Minden. It's actually a much larger cut, we are just looking at the corner of it. On the photograph -- is that focussed all right, Catharine?

Q. I think it is. It seems clear to me anyway.

A. On the photograph you can see a

landing right here. (indicating) There is a tertiary road leading into the landing and leading away from the landing we see a main skid trail. We are going to be standing down on the ground in a few minutes, so I am just going to point out a few spots, particularly this tertiary road leading in.

You can also see the stand boundary running through here like this and back beyond, and those are maple stands on the left side and it was a poplar stand on the right. This straight line, the Dr. Euler straight line approach here is a boundary between Crown and private land.

The soils on my unit are very shallow and the bedrock is never far beneath the surface and it's kind of a -- it's a rugged and broken ground, but not very high relief. What this means is that there is all kinds of drainage patterns throughout this area and any time we do a poplar clearcut, it has been my experience that beavers move in very, very soon after the cut, within a year or two, and they flood up these deprsessions. And they can flood them up because there is a depression there and drainage from that depression is impeded by the underlying rock.

So in this particular picture, we are looking at four different ponds, one, two, three, four,

which I know did not exist before the cut and those ponds have been created by beavers damming them up. Well, it is right at this time of year, every spring, about now, that the young beavers are driven from their established colonies by their parents and they wander off looking for new opportunities to establish new colonies.

And I had this point driven home to me because just last weekend I was out for my morning run and I passed one and he was about a quarter of a mile from the nearest water and he ended up in the neighbour's pond right in front of the house, spent the day there and then moved on.

At any rate, what happens in these ponds, the beavers establish and they eat the poplar, I wouldn't want to say anything about our national symbol, but they eat all this poplar around the edge of their pond and they eventually deplete that.

Of course, in the meantime, they have established the ponds and the ponds are also home for frogs and the blue herons come and land and catch frogs and racoons move in, they catch frogs too, they would live over here somewhere. Very, very adaptable creatures. (indicating)

As time goes by, those beavers deplete

their food reserves and they actually cause a species conversion around the edge, which we are going to see in a moment. The result of all this is that they get beyond their maximum skidding distance for moving this poplar to water and when that happens they can get caught very easily by wolves and coyotes, and eventually they are either -- they move on. Some of them are killed off and others move on and they abandon their pond. And when they abandon their pond the dam eventually washes out, the depression eventually drains and we are back where we started again.

This is photograph 3.5 which is the tertiary road leading into the landing. If you noticed on the previous slide, that regeneration had not occurred on the landing or the road or the skids trail. This was a summer operation and the road and the landing were gravelled, so we do have compaction there. We don't have regeneration, but people use those roads. You can see that people have been driving in and out.

And that is a six-year-old large tooth aspen stand and you will see this picture again in Panel 12 and you will see what it looked like at the time of the harvest and the treatment that was carried out following harvest.

Balsam fir --

MS. BLASTORAH: Mr. Chairman, perhaps before we go on to the next species, would this be an appropriate time for a break?

THE CHAIRMAN: Okay. We can take a break at this time. 20 minutes.

---Recess taken at 10:20 a.m.

---On resuming at 11:05 a.m.

THE CHAIRMAN: Thank you. Be seated, please.

MS. BLASTORAH: Q. I think just before the break we were going to start speaking of balsam fir, Mr. Hynard.

MR. HYNARD: A. That's right, balsam fir. This is photograph 4.1. It's an understorey of balsam fir advanced reproduction in a boreal mixed wood stand on the Cochrane management unit.

By advanced reproduction I include seedlings and saplings and seedlings on the forest floor and saplings in the understorey and, in this case, we have got quite a wide range of ages and sizes of balsam fir in that understorey.

I mentioned yesterday that balsam fir is a commercial species, it's used across Ontario, it's used in lumber manufacturing, it's used in some pulping operations though often there is a balsam limit on how

much they will take into the mill and mix with other species. And so it is a commercial species, it's not a preferred species for the reasons that I described yesterday.

But despite its problems, partial markets do exist for balsam fir and the stocking standards of those silvicultural groundrules do list balsam as an acceptable species, although often in those silvicultural groundrules there is a specified limit on the amount to which balsam fir can contribute towards acceptable stocking.

This is a well-known fact and in one of the interrogatories the question was posed: What is the limit for balsam fir to contribute towards acceptable stocking. And the answer to that one is: Well, there is no set rule. The silvicultural groundrules for each management unit would set out on their Table 4.11 what is the limit, if any, for balsam fir by site type and treatment type.

Many of the groundrules that I have seen within the boreal forest set a 10 per cent limit on balsam fir and that is that balsam fir shall contribute no more than 10 per cent towards acceptable stocking. So it's sort of a preferred species and sort of a non-preferred species in that sense.

What happens if that limit is exceeded. That question too was asked. What happens if there is more balsam in that cut-over than the 10 per cent limit that is stated there. Well, the answer to that is pretty simple, it just means that that extra balsam will not be counted towards acceptable stocking. In other words, the stand will not have met the minimum standards if all that is there is balsam. The extra over and above the 10 per cent limit, if that unit has a 10 per cent limit, simply would not be counted.

Q. Mr. Hynard, just on that point, might that mean that you could have a stand that would be very heavily treed, if you will, a lot of balsam trees there, but the stocking would still remain low because only 10 per cent of those trees would be counted towards the acceptable species?

A. Yes, that's right.

Q. Thank you.

A. On cut-overs that are being left untreated to regenerate to non-preferred species as we have been discussing yesterday and today, there is of course no limit on balsam fir and there we are talking about cut-overs that have been harvested, they are being left untreated to regenerate naturally and, in that case, we accept balsam fir.

The groundrules will state that balsam fir is acceptable and poplar, they will list whatever the acceptable species are, although in those cases they would not be preferred species as I have defined them this morning.

This is a young stand of mixed poplar and I think I see white birch in there and balsam fir also and it followed the harvest of a boreal mixed wood stand without treatment. This particular stand was a boreal mixed wood stand, it was clearcut and it was allowed to regenerate entirely by natural method unassisted and I think this is fairly typical of the kind of regeneration that one would expect under those circumstances.

We have a tremendous amount of poplar regeneration from root suckers and you can see that there is also a tremendous amount of balsam fir regeneration from advanced growth.

Natural regeneration of balsam fir is very, very easy to secure. It likes a moist seedbed, but it is not discriminating with regard to the nature of the seedbed other than it's moisture. So that rotting duff, a leaf litter, even a needle mat will do as long as it's relatively moist. Seed crops are periodic and the seed germinates in the understorey.

Balsam fir is a very, very tolerant species, shade tolerant, and so with this non-discrimination in seedbed other than moisture and a relatively low light demand, it can establish in the understorey and on certain sites it's common to have considerable amount of balsam fir advanced reproduction in the understorey.

And if the stand is partially cut, then the balsam fir has a tremendous advantage because of its shade tolerance and stands of that nature that are partially cut tend to regenerate heavily to balsam. If the stand is clearcut, such as this stand has been, the competitive advantage is given to the poplar.

And so here we have a poplar stand with a balsam fir understorey and at its maturity it may look very similar to the previous picture which was 4.1.

It's possible I didn't name that photo. Do you recall, Ms. Blastorah?

Q. I think you did indicate -- Oh, I believe it was 4.2.

A. Yes, that's correct.

Q. No, I'm sorry that one was 4.1.

A. We are now at photograph 4.3. And 4.3, do you remember that most distant beaver pond where I was talking about the beavers. The most

distant beaver pond in the distance, you are now standing just above that pond at the limit for the maximum skidding distance for beavers.

And what has happened here, in that particular stand it too had a balsam fir understorey of advanced reproduction. However, when you looked at that photograph you could see nothing but poplar following that clearcut. Balsam fir remained in the understorey because of the competitive advantage given to poplar, however, the picture that you are looking at now, the activity of beaver there has given the competitive advantage back to balsam fir. They have been cropping off the poplar and releasing the balsam advanced growth.

And in fact it's one of the beavers -- or one of the principal reasons that when you look around lakes and rivers and creeks and beaver ponds they tend to be fringed with a ring of conifer and that is primarily the reason because of this constant release work that beavers give to the conifer over time. They cut in a selective style fashion towards the poplar leaving the other species, and that is a real good example of it right there.

White pine, Ontario's provincial tree. White pine is a difficult and expensive species to

regenerate by natural means on it's most common site type. And I will describe that site type as a variable depth, but generally shallow and very shallow sandy till over ridgy broken and fractured bedrock on rugged broken ground.

This is a very common site type for white pine and white pine usually is in association with a number of other species; poplar, red maple, balsam fir, and occasionally white birch and others on that particular site type. White pine does not necessarily represent an extremely strong component in the stand, it's often a minor component in the stand on that site type.

White pine's great difficulties in regenerating itself stem from its very slow start. And the tree that you are looking at there is a one-year-old seedling and that little one-year-old seedling might be no more than an inch and a half tall and during that same time period, during that same first growing season, it's associates poplar, red maple, balsam fir and white birch would have been able to grow at least several feet during the same period.

So it occurs on that particular site type which is a very competition-prone site type. It is prone to competition because it's good dirt. Those

sandy tills, sandy loams, loamy sands, silty very fine sands are good dirt and drainage is impeded by the bedrock so that they are relatively moist, moisture than you would expect given their depth.

Unfortunately they are very, very are poor sites for these other species because they are so shallow. The trees get pot bound, at least those other species get pot bound. They are so aggressive at the start because they don't realize they are going to be pot bound. White pine, on the other hand, is a great performer on that site type because it has a very flexible, adaptable root system that will search out those pockets in the soil and depressions between the rock and it's getting all that nutrient and moisture that is draining down across the rock into those pockets.

Q. Mr. Hynard, when you say they are poor sites for those other species and that the trees become pot bound, what would the effect of that be?

A. It limits their performance. It's simply that the tree would not be able to develop to the large size and maintain a good growth rate over a long period of time. It does in its early years because that's good dirt and it has got good moisture, but it soon becomes limited by the availability of

rooting zone for all of those species on that site type, and I'm referring to its common associates poplar, red maple, balsam fir, and white birch.

Q. Thank you.

THE CHAIRMAN: Mr. Hynard, is it essentially sort of a general rule of thumb that the slower starters end up being the bigger trees in the end? I'm thinking of things like oak trees or white pine?

MR. HYNARD: Yes, yes.

THE CHAIRMAN: Or these ones that end up being massive trees in diameter later on.

MR. HYNARD: Yes.

THE CHAIRMAN: Are ones that started offr slower?

MR. HYNARD: That's true to some degree. There are characteristics that you can group together. If, for example, we group pioneer species, the kind of species that are favored by catastrophic disturbances, catastrophic stand origins, species like jack pine and poplar for example, they share some characteristics.

First of all, they are very fast starters, they have a very rapid rate of growth and they have relatively poor longevity and they have generally poor resistance to decay.

On the other hand, trees that are later in succession such as maple and hemlock and so on tend to have better longevity, slower rates of growth. There are -- you can group them, but it's not -- it's not a perfect grouping. Balsam fir works the other way, very tolerant, it tends to be a climax species but poor longevity and so it's sort of yes and no to your answer -- or to your question.

This is another photograph from Panel 10 and the reason that I have been using some of the same pictures over and over again is to show you that the packaged nature of silviculture - and, in fact, some of them you are going to see again in Panel 12 - that the harvest and regeneration and indeed the tending are inseparable parts of those packages.

At any rate this picture was taken immediately following mechanical site preparation on one of these difficult sites. It's a wide-angled lens so it's distorting the view a little bit. The stand actually has higher stocking levels than it appears to have in this particular picture. As you will see in subsequent photographs.

The mechanical site preparation was done to assist natural regeneration, so we now have a warm, moist mineral soil seedbed, just what white pine likes.

White pine can be dried out, it doesn't like to be dried out in its first year following germination, and shelterwood gives it a little more protection than it would have in the open.

This site was given a couple of months to green up following the mechanical site preparation and then it received a chemical site preparation that same growing season prior to seedfall. And if you look at that picture not only can you see that there is good seedbed here and there, but there's a tremendous amount of greenery in here.

Another factor that makes it so difficult is that the species of the understorey, particularly red maple and hard maple, are so difficult to control chemically. They are very, very tough species. Some of the other shrubs in there such as beet hazel and poplar and pin cherry are relatively easy to control. But on this particular site type maple would be present in the understorey.

Now, here we are at the same point, this is photograph 5.3. We are at the same point six years later and I'm standing there with a white pine seedling that originated six years prior following that treatment. The stand has received the chemical cleaning in the meantime and, unfortunately, white pine

is more vulnerable to our registered herbicides than are species like spruce. And so it's very, very difficult to release them chemically.

The window, the time that you have to carry out a cleaning is so small. You have to do your spraying after the pine have become dormant in the fall but before the competition has become dormant. Very narrow window, very difficult situation and the picture that you are looking at is exactly the kind of situation that is described in the exhibit.

Ms. Blastorah, do you have the exhibit number, the Forests for Tomorrow interrogatory on past results?

Q. Yes, it's 540, Exhibit 540.

A. This is exactly the kind of situation that is described in Exhibit 540. This white pine seedling is looking pretty good. It's showing a good growth rate and it's looking like it can finally break and beat the competition. If it is grown free of competition, white pine grows faster with each year and it becomes a faster grower and a strong competitor. The difficulty is in getting it through those first 10 to 15 years.

Q. Mr. Hynard, you used a term that I think is new the Board, chemical cleaning. It may be

clear from the context, but could you just explain that term?

A. Yes. Cleaning treatments are treatments carried out in young regenerating stands to free the crop trees, the crop species from their competitors. Chemical cleanings are treatments that are affected by herbicide; that is the area is sprayed to kill the competitors and release the crop trees.

Q. And I think we will hear more about that in Panel 12.

A. On the other hand, hard maple is a real joy to work with. It too can be tricky but not with respect to regeneration.

Hard maple is a species that is very tolerant of shade and it requires no seedbed preparation. It's a periodic seeder, the seeds fall in the autumn and the way it likes to regenerate, it likes to have those seeds fall on a leaf litter and leaves fall on the seeds and those seeds germinate in the spring prior to leaf out. In fact, germination will occur under the snow, very cold temperatures, and those young germinates have about a month in which to get going before green up occurs before the leaves come out on the overstorey.

So it behaves a little bit like a spring

flower in that sense. They have a tremendous capacity to penetrate leaf litter and they will -- the germinate will just -- it's like it drilled a hole right through a couple of inches of leaf litter and established itself. Now, those seedlings can number up to a quarter of a million per hectare and they can form a virtual carpet of advanced reproduction like you see here.

As long as the overstorey is closed, as long as there is no disturbance, no cutting and there's a full canopy over top, the seedlings can't develop. They are very tolerant of shade but, nonetheless, there's simply not enough light for them to develop. However, they will respond to any stand opening, be it partial cutting, clearcutting or natural disturbances. And when that disturbance occurs, their response is immediate.

This is photograph 6.2. It's a picture of a hard maple stand six years following selection cutting and those seedlings that are in the foreground, I will just point to one, are all hard maple. They would have been tiny little seedlings on the forest floor at the time of the cut. And you can see that this tree, it's grown from this point to this point in the last growing season which is pretty good when you

consider the amount of light that is available to it.

All this greenery that you see in the background is also hard maple, seedlings and saplings from advanced reproduction.

Q. Mr. Hynard, the picture that you showed us before which would develop into this kind of a stand, would that be a situation where you would want to use careful logging to protect that advanced growth in the same sense that you would have in the photos you showed us before of the conifer?

A. You are thinking -- you are thinking similar to the lines along which Mr. Oldford described the wide-tired logging?

Q. Yes.

A. No, no, not along those lines. And the reason for that is that when you've got a quarter of a million per hectare you can afford to lose a few thousand.

Now, there are differences with regard to logging practices. Winter logging, for example, results in virtually no damage to the advanced reproduction and the reason for that is two-fold. First of all, the skidders tend to remain on their trails, they remain on their trails because it's easier for them to move on a previously broken trail than it

is to plow through deep snow. Secondly, the seedlings are protected by a blanket of snow.

Summer logging operations tend to be more destructive and when these seedlings, the advanced reproduction are destroyed, when they are run over with a skidder with a full hitch of material behind it, well a couple of things can happen.

First of all, if it's only one pass and it decapitates the tree it will sprout again and it will sprout to produce a perfectly acceptable tree once again. If there are several passes, such as is normal on a skid trail, then no resprouting can occur because the damage is too severe. And normally what happens on the skid trails is that the maple is replaced by other species depending on the stand and the site and a whole host of other factors.

Now, what I have said then is that it's really not necessary to require special logging measures to protect advanced reproduction when you have those kinds of numbers. I have always had maple stands regenerate satisfactorily, however, I would draw the line at the use of full-tree logging in this situation.

If you are selective cutting and you are dragging out trees tops and all, then you are going to damage your residual stand, there is just no way to

avoid it and it will be far more destructive of the advanced reproduction also.

Now, that sounds like it contradicts a little bit what Mr. Oldford was saying was that you got your least damage with full-tree and that's because he was showing examples of them lifting the trees out of those strips and forwarding them out and confining their skidding activity even where they are skidding with conventional skidders to skid trails. It's sort of -- it would be a different world, it really...

Q. Does the difference relate to the difference in the two forest types?

A. Absolutely. Oh yes.

This is photograph 6.3. It's a hard maple stand five years following a clearcut with standards and at age five to ten following this kind of treatment, young maple stands are so thick with regeneration that you can hardly fight your way through them.

Now, on these skid trails you would tend to have raspberries and blackberries and elderberries and less maple. You may have other species regenerating there like yellow birch and red maple on the skid trails, but normally the amount of area in skid trails is relatively low and this is very, very

similar to the stop on the southern site tour following the adventure down Highway 28 with Jim McCreadie. And you recall what that maple regeneration looked like in that clearcut.

Before I leave hard maple in my witness statement I said -- I made the statement that natural regeneration methods always produce superior results to artificial methods with poplar, hard maple and some other hardwood species. And in an interrogatory the OFIA asked -- OFIA/OLMA asked for some proof that these species can be regenerated by these methods. And we are now filing that interrogatory and our response.

MS. BLASTORAH: Q. What number was that, Mr. Hynard? I don't have it noted.

A. I don't have the number either. It's the one with the table attached.

Q. I believe it's number 10. Yes.

A. Is there a table attached?

Q. Yes, there is.

A. Yes. Those results were taken from stocking assessments carried out on my own unit for both hard maple and poplar following clearcutting in both cases and natural regeneration.

In the case of the maple, it was unassisted natural regeneration; in the case of the

poplar with residual trees were felled to provide better conditions for poplar regeneration.

And those figures will show stocking levels that are simply impossible to obtain by planting on those site types. In addition to the higher stocking, there's higher density of trees which in maple and poplar is desirable. It's not necessarily desirable in conifers to have excessive density.

MS. BLASTORAH: Mr. Chairman, I think the next exhibit number is 542. Could we mark OFIA Interrogatory No. 10 and file it, please?

THE CHAIRMAN: Very well. We will mark it as 542.

---EXHIBIT NO. 542: OFIA Interrogatory Question No. 10 and response (Panel 11).

MR. HYNARD: If you are looking on that table you will see that half of the area assessed in hard maple had 90 per cent stocking and higher which is absolutely impossible to obtain with tree planting.

MS. BLASTORAH: Q. Why is that Mr. Hynard?

MR. HYNARD: A. Oh, that's a big question with a very long story and I think Mr. Waito is going to answer that question.

Q. Thank you.

A. This afternoon.

Moving on to yellow birch. Yellow birch is another hardwood species that can be regenerated by natural means but certainly not with the ease and the success rate of maple. Yellow birch is an important species, very important commercial species within the Great Lakes/St. Lawrence forest for the saw mills and veneer mills in that area.

This is photograph number 7.1 shows yellow birch, fresh young yellow birch germinates immediately following mechanical site preparation. I'm going to have to point them out to you.

You may recall this photograph also from Panel 10. This area was cut under the uniform shelterwood system following which it received a mechanical site preparation treatment, light blading with a small crawler-tractor and these tiny little green things that you see here everywhere, tremendous numbers of them, are fresh young yellow birch germinates in the first growing season following germination.

Yellow birch is a species that does not produce advanced reproduction. The reason that it doesn't is that it cannot penetrate the leaf litter that occurs under its own stands. The seed simply does

not have the stored energy with which to penetrate that leaf litter. It absolutely requires a mineral soil or a piece of rotting wood.

And since it's easier to create mineral soil exposure than distribute pieces of rotting wood throughout the forest and more successful, yellow birch is assisted by mechanical site preparation, usually something along these lines.

The reason I mentioned about the rotting wood is that occasionally you see a yellow birch in the bush perched up on stilts and the seed would have germinated on a rotting stump and the roots spread down the side of that rotting stump into the ground. Well, 50 years later the stump may have rotted away and we now have a birch perched up on these stilts, and you run into it occasionally and that's the reason for it.

This is photograph 7.2. We are standing at the same spot we were in in photograph 7.1 except we are six years later, and you can see that there's lots of yellow birch regeneration.

Back in Panel 10, Ms. Swenarchuk was trying to coax me into stating that large clearcuts would affect the survival of planted stock and they would do so because of the drying effects of sun and wind -- or perhaps it was wind alone. Well, I didn't

agree with that proposition, but it certainly is true of young yellow birch naturals.

Birch seedlings are very, very shallow rooted and they are very, very prone to dessication. They have a very, very low rate of survival if they are exposed to open sunlight in their first year following germination. And it is for this reason that shelterwood, either strip shelterwood or uniform shelterwood is commonly used as the silvicultural harvest system for the regeneration of yellow birch. It gives the young seedlings some protection from dessication by sun.

Yellow birch, though, is not a shade tolerant species, at best it is intermediate and if it's left at low light levels, such as we have in this picture, it is not going to be able to develop to maturity. In fact, it is not going to be able to compete with the hard maple that is also here from advanced reproduction.

So a stand in the condition that we are looking at should now be cut for the residual timber. You will recall that a shelterwood cut is a two-stage cut, a two or more stage cut. In this case, a two-stage cut would be appropriate. Shelterwood cut to obtain your regeneration, then a shelterwood removal

cut to release your regeneration.

When should that shelterwood removal cut occur? Well, in this case it should occur as soon as the yellow birch is no longer vulnerable to dessication. So it could occur by year three; possibly year two, but certainly year three.

Is there any advantage in delaying the removal cut longer? The answer is no, there are disadvantages in delaying and those disadvantages are suppression of the yellow birch, giving a competitive advantage to its associated hard maple, and the larger it gets the more vulnerable it is to damage by logging equipment when you make that return cut. So in this case, this stand is ready for a shelterwood removal cut.

Here we are again, photograph 7.3. We are at the same spot. This picture is a little dark. What I am pointing to there is browse damage by white-tailed deer on yellow birch regeneration. This stand is very heavily browsed by deer. Deer do leaf stripping and they strip the elongating shoots off yellow birch regeneration during the early summer. They really like it and they go right at it, and they will feed on yellow birch, they will browse on yellow birch during the wintertime also. And when deer

numbers are high enough, they can affect the success of yellow birch regeneration, they can also affect the success of hemlock regeneration because that's a preferred winter browse species for them also.

A shelterwood removal cut in that stand might now help those trees in the face of this heavy use by deer. It would allow them to get going and outgrow the reach of the deer. Another strategy in the face of heavy deer browsing would be to enlarge the size of the cuts, make the cuts large enough that there is more browse produced than those deer can consume, and that gives the trees the chance to outgrow the deer before they are badly damaged.

Usually what happens by browsing is that the tree may eventually recover once it outgrows the deer, but in the meantime a competitive advantage has been given to the other tree species which are not being browsed to the same degree. The same sort of thing that we saw in the case of the beaver.

How common is damage to regeneration by wildlife, and there I would say damage to the extent that it is affecting the success of regeneration efforts? Not very common.

That's the end of the slide series.

Q. We now have Exhibit 534A back up on

the screen.

A. Yes. I just wanted to summarize a few points before I conclude my evidence on natural regeneration methods. And, first of all, I would like to state that natural regeneration methods play a large role in Ontario's forestry scene. Over half of the area that is cut is regenerated by natural means.

The two types, natural regeneration to preferred species as I described to you earlier here, and natural regeneration to other commercial species as I described to you here.

Non-preferred does not mean that they will be non-utilizable at maturity, it simply means non-preferred.

I am going to replace 534A with B. Of the area that is left to regenerate to these other commercial species about half, this area here, is non-treatable. (indicating)

Q. That's the yellow area on the graph?

A. The yellow and the brown combined. By untreatable, I mean that it is uneconomic or impractical to treat in order to regenerate commercially preferred species, it is not impossible to regenerate. Despite our inability to treat these areas, there are sound reasons for their harvest and

they do regenerate to these other species. The effects in those areas are no greater on other forest uses and values than in treated areas.

And, lastly, unfortunately natural methods to regenerate preferred species, the area in green, is limited by the availability of suitable stand and site conditions for their use. And I tried to describe to you the nature of those limitations for all of the various species throughout that series of slides. It is simply not possible to use them everywhere in order to close the white area, at least not with preferred conifer species.

And that, Mr. Chairman, is my evidence.

MS. BLASTORAH: I think this would be a convenient point to break, Mr. Chairman.

THE CHAIRMAN: Okay. All right. Ms. Blastorah, we are suggesting that we return at 1:30.

MS. BLASTORAH: Thank you.

THE CHAIRMAN: Okay.

---Luncheon recess taken at 11:50 a.m.

---On resuming at 1:40 p.m.

THE CHAIRMAN: Thank you. Be seated, please.

MS. BLASTORAH: Mr. Chairman, the next witness will be Mr. Waito who is going to be dealing

with artificial regeneration.

Q. Mr. Waito, what are the main messages you wish to convey to the Board through your evidence?

MR. WAITO: A. I have got three main messages. The first, and I think one of the most important, is that artificial is a necessary component of our renewal program. It may be the only method on certain sites to achieve conifer stocking levels, it would be outlined in the timber management plan.

Artificial regeneration also --

MS. SWENARCHUK: Excuse me, Mr. Chairman, I can't hear.

THE CHAIRMAN: Mr. Waito, could you talk a little closer to the microphone, please, and just a little bit slower--

MR. WAITO: A little bit slower.

THE CHAIRMAN: --because the reporter might have a little difficulty keeping up.

MR. WAITO: Okay. We will start over again. Artificial regeneration is a necessary component of our renewal program. In fact, it may be the only method that will ensure that conifer stocking levels are achieved on certain sites. Artificial regeneration, in particular planting, allows for greater control over results, particularly with regard

to species, spacing, stocking levels and ultimately has an impact on growth and yield.

In the artificial regeneration program, there may be a range of acceptable options for renewal on any particular site and these options are influenced by a number of factors. Mr. Hynard spent considerable time discussing these and I will touch briefly on them later on in my evidence.

The third message. Because artificial regeneration and, in particular planting -- tree planting is costly and funding is limited, the renewal program must be conducted in the context of an overall balanced timber management program. And by balance, I am referring to not only the balance between renewal methods, natural regeneration, low-cost artificial regeneration and tree planting, but also the balance in the context of the overall program which includes timber management planning, data collection, tree improvement, technology development and transfer, and that's just a short list.

MS. BLASTORAH: Q. What methods of artificial regeneration are currently in use in Ontario?

MR. WAITO: A. In Ontario today there are essentially two methods, direct seeding and tree

planting.

THE CHAIRMAN: Ms. Blastorah, I don't want to interrupt, but we seem to be getting into areas that we feel, from our perspective, we have covered several times before in various contexts.

You know, in Mr. Armson's evidence, he dealt with a little bit of the various methods of artificial regeneration, Mr. Hynard certainly has, some of the other witnesses have. And all we are saying is, is that I think in terms of going into any kind of detail, unless it is something different, substantially from what we have heard, we feel that some of this repetition isn't all that productive.

MS. BLASTORAH: I am not entirely sure in what areas you are particularly speaking of. We don't --

THE CHAIRMAN: Well, for instance, just getting into this last statement made by the witness: What are the two methods of artificial regeneration? Well, surely we have heard some evidence to this point on the two methods.

MS. BLASTORAH: Yes, I think that's true, Mr. Chairman, and we aren't going to spend a great deal of time talking about it in a general sense; however, this is the renewal panel that is intended to deal with

those activities on the ground and in the field. And, in that sense, the operations are really the essence of what the evidence here in this panel is to be about.

Mr. Waito is going to be talking specifically about operational aspects of that and, to some extent, I guess in is inevitable we are going to touch on areas when we are talking about the same activity. We are talking about planting and talking about seeding.

However, what we are going to see I think is a series of slides about some of the equipment that's used to do this sort of thing and it is really on-the-ground activity.

THE CHAIRMAN: Okay. We have no objection dealing with that in more detail because maybe it is an area that we haven't dealt with in detail, but perhaps we could cut down where we can, even in the general areas, on stuff we already heard before.

MS. BLASTORAH: We will try to keep it short, Mr. Chairman. If you could give us some assistance where you think we are straying into areas that have already been covered, that will be of great assistance to us, what the Board feels that they have already heard.

Q. In that context, could you very briefly indicate the relative use of these methods in the province; that is, planting and seeding?

MR. WAITO: A. Yes, I can, and I certainly will try and be brief. One of the pitfalls in coming later on in the series of panels here.

MS. BLASTORAH: I am sure Mr. Waito has no problem with the suggestion that he should say less rather than more.

THE CHAIRMAN: Could you just move it over just a little bit.

MR. WAITO: What I have here is a figure taken from--

MS. BLASTORAH: Q. It is page 150.

MR. WAITO: A. --the witness statement and it was simply put in to depict over approximately a 20-year period the development of planting and seeding in Ontario.

Mr. Hynard has given I think a fairly good indication of various renewal methods and where they fit in. This particular slide here just breaks out planting and seeding to show the relative amount of each of these techniques that has been used. There are a couple of messages in the slide.

I think the most important is that since

1966 the artificial regeneration program in Ontario has steadily increased from just over 20,000 hectares to I believe it is around 85,000 hectares in 1988.

Seeding, which is a smaller component of the artificial regeneration program, was quite small in the early years where the technology wasn't there, wasn't widely used. In the beginning of 1975, the amount of seeding increased for a period of time and this was to offset a decline in the production of container stock. At that time, the tube seedling program for a number of years was providing a fair amount of seedlings for the planting program and as it phased out, a certain amount of seeding -- extra seeding was done.

In 1981, quite a large amount of seeding was done and that was in reflection of a bad fire year in 1980, particularly in the northwest region. So there was -- a fair bit of the seeding was done. And I guess from 19 -- the early 1980s and on, the artificial regeneration program, particularly of planting, expanded quite considerably and this coincides with the beginning of the FMA program and, of course, the coming on stream of our container stock facilities that are used in Ontario to produce container stock.

That's it for figure 1.

MS. BLASTORAH: I don't think there is any need to mark that, Mr. Chairman, it is already contained in the witness statement at page 150.

THE CHAIRMAN: Very well.

MS. BLASTORAH: Q. Mr. Waito, could you briefly indicate -- describe the two methods that you have just been speaking of, planting and seeding, and what they involve, briefly?

MR. WAITO: A. Planting and seeding involve a series of related activities, and Mr. Hynard has already I believe mentioned some of these activities, and I will just briefly refresh the Board's memory.

We begin with seed collection, of course, followed by stock production for planting and in the case of stock production we may be looking at growing bareroot stock which may take up to four years to produce or, we may be interested in producing container stock which may be produced in -- actually only 14 weeks.

In most cases, of course, site preparation is required for both planting and seeding. There is the actual activity itself, the tree planting operation or the seeding operation, and following that there may be a necessity to do stand maintenance, and

by stand maintenance I am referring to juvenile spacing in the case of seeding, or in the case of both seeding or planting, stand cleaning. So tending with herbicides, for example. So we really are looking at a series of related activities, a package, a silvicultural package.

Q. And I understand at this point you would like to use some slides to illustrate the points that you will be making during your evidence?

A. Yes, I do. If I could get someone to turn on the slide projector and douse the lights. It is all set.

MS. BLASTORAH: We do have a list of the photographs. I believe they are all contained in the witness statement. However, we do have -- we won't be using all the slides or the photos from the witness statement, so Mr. Waito has prepared a list indicating the slide number as it is given in the witness statement and he has prepared that in the order we will be seeing them today.

THE CHAIRMAN: Okay. So why don't we give the list Exhibit 543, and this will be a list of the photographs referred to and set out in Exhibit 532A commencing at page...?

MS. CRONK: 192.

MS. BLASTORAH: 192.

THE CHAIRMAN: 192.

MS. BLASTORAH: And just for the information of the Board, I believe the description that is given on this new list relating to the slides is precisely the same as what is contained in the witness statement. They have just been reordered in the order we are going to be seeing them today.

THE CHAIRMAN: Thank you. And I take it that under the same exhibit we will ultimately get hard copies of the photos?

MS. BLASTORAH: Yes, that's right, Mr. Chairman.

THE CHAIRMAN: Thank you.

---EXHIBIT NO. 543: List of photographs referred to and set out in Exhibit 532A commencing at page 192.

MR. WAITO: Okay, we are set. The first slide is a pretty simple one just showing some clean jack pine seed. I don't think we have seen a picture of seed yet, we have seen pictures of young seedlings. The seed you see here has been collected by the Ministry seed collection program. I believe Mr. Baker will be discussing that later.

It is ready for sowing in a nursery to grow bareroot stock or container stock. It is also

ready to be shipped to the area to be seeded or ground seeded. Aerial seeding of jack pine in particular produces good results operationally when used on appropriate sites.

MS. BLASTORAH: Q. Is black spruce used for direct seeding?

MR. WAITO: A. Foresters have had limited success operationally in seeding black spruce, and the difficulty is three-fold. On upland sites, the most suitable seedbed for black spruce is within a few centimetres of the mineral soil humus interface and using the equipment we have available today it is quite difficult to get sufficient exposure of this seedbed to make broadcast seeding an operationally viable alternative.

The difficulty comes in the very thin layer that we are trying to expose, and essentially the equipment just cannot achieve the level of precision over the rough site conditions and terrain that we are usually trying to operate in on upland sites.

The optimal seedbed exposure in terms of per cent for aerial seeding or broadcast seeding is around 25 per cent, so we are looking at trying to expose 25 per cent of the gross area of a cut-over to provide sufficient seedbed to achieve the minimum

stocking levels and that's quite difficult.

On lowland sites, as Mr. Hynard has already indicated, spagnum moss is an excellent seedbed and where it is necessary to possibly do some shear blading or as a site prep technique to provide for a greater amount of seedbed, under these operating conditions it is possible to produce an acceptable seedbed. Broadcast seeding on this seedbed type is considered more feasible and currently I believe it is being explored in the Clay Belt area in particular.

The second difficulty with black spruce seeding relates to the micro-site conditions that are necessary for good germination of black spruce seed, in particular the moisture conditions for acceptable germination and establishment are more critical for black spruce and for jack pine. Spagnum moss sites satisfy this requirement and that's one reason why direct seeding on these sites offers more promise than on uplands.

However, on uplands sites where the soil/moisture relationship may be favourable for the germination and growth of jack pine, the same conditions may not be as favourable for the germination and growth of spruce. Hand or spot seeding - and I will talk a little about that - where the micro-site

can be carefully selected may increase the success of seeding with black spruce.

There have been some recent developments in hand seeding technology that offers some promise for this renewal method and I will be talking a couple of slides later about that.

The third factor, and I think one again that Mr. Hynard alluded to this morning, is the amount of seed required and the timing of the seeding to achieve acceptable stocking levels to black spruce. It appears that more than one application of seed at a much higher rate than has normally been used may be necessary to achieve a good catch or sufficient stocking.

Now, these are conditions that will be found in a natural regeneration method such as strip cutting or seedfall. It usually occurs to some degree on more than just one year of a three to five-year leave period.

I think the point to be made here with direct seeding is that direct seeding of jack pine on the right site and under the right conditions is considered a fairly reliable operational treatment method and that's why it is used fairly extensively; whereas the direct seeding of black spruce does not

carry the same degree of reliability and is not presently used operationally for that reason.

I would like to point out that young germinants, whether they be jack pine or black spruce, are very susceptible to excessive heat, drought, freezing temperatures and the effects of competing vegetation. Therefore, even under ideal conditions direct seeding has a level of risk which the forester is unable to do much about, but it is one that he must accept if he is going to use the technique.

Q. What techniques are used to carry out direct seeding operations?

A. There are essentially three. Hand seeding, mechanical ground seeding, and aerial seeding or broadcast seeding. And I would like to take a little bit of time to describe each of these.

Ground seeding can be done by hand and, as I indicated earlier, one of the advantages that is offered is of course better selection of micro-site and seed placement.

Hand seeding is very labour intensive so, therefore, it is quite costly and for that reason it is not widely used. In fact, we don't always get good results for the reasons I mentioned earlier in light of being able to select the micro-site more carefully. In

order to improve the odds or take away some of the risks of hand seeding, we are looking at some new technology in this area, renewal.

Photo 2.4 on the screen is a picture of a hand seeding tool that was developed in Scandinavia and beside it you see a little shelter cone, a plastic biodegradable cone. In fact it is a mini-greenhouse, and it can be used for seeding of black spruce or jack pine, and it is currently being used by several forest management agreement holders and is being investigated by technology development units in Thunder Bay for application on a variety of sites.

I think we have a technical bulletin that we would like to file at this time.

MS. BLASTORAH: Yes, Mr. Chairman. This is a publication of the Northwestern Ontario Boreal Forest Management, I guess is the title of the publication. Is that correct, Mr. Waito?

Northwestern Ontario Boreal Forest Management and the title of the publication is Technical Notice?

MR. WAITO: That's correct.

MS. BLASTORAH: And it is publication No. TN-01 dated 1989.

THE CHAIRMAN: Exhibit 544.

MS. BLASTORAH: Just for the exhibit list, the title of the particular article is: Shelter Seeding, Black Spruce and Jack Pine in Northwestern Ontario, and the authors are B. Campbell and W.D. Baker.

THE CHAIRMAN: Is that R.B. Campbell?

MS. BLASTORAH: Just B.

MS. SEABORN: Not likely.

MS. BLASTORAH: That was 544, Mr. Chairman?

THE CHAIRMAN: That's correct.

---EXHIBIT NO. 544: Publication of the Northwestern Ontario Boreal Forest Management, entitled: Shelter Seeding, Black Spruce and Jack Pine in Northwestern Ontario, No. TN-01, 1989.

MS. BLASTORAH: Q. And this deals with the same technology you were describing in slide No. 2.4; is that correct?

A. That's correct.

Q. Slide 2.5 is a shot of, I would guess to be a two-year-old jack pine seedling or several two year-old-jack pine seedlings emerging from the top of a zircon shelter cone. In a nutshell, the idea behind the technology is the plastic cone acts like a

mini-greenhouse and provides a micro-micro-climate because it's a very small area we are looking at here that is more conducive to germination and early establishment, provides optimum temperature and humidity requirements to improve germination.

The downside to this particular technology, if you want to call it that, is the cost of these cones is quite expensive, they are about 6 cents a piece so that's about $60 a thousand and the cones have to be put in the cut-over by hand.

So it is an expensive natural regeneration -- or artificial regeneration system, but it does offer an opportunity to cut down on the risk and improve results. And I guess the point here is that it does cost money to reduce the risk of failure and that the level of risk and the level of cost which are acceptable will vary from situation to situation.

Q. Perhaps just before we go on, Mr. Waito, Mr. Baker I believe you are familiar with this publication?

MR. BAKER: A. Yes.

Q. You are one of the authors, I believe?

A. Yes, I am.

Q. Could you tell me whether this

publication is sent out to the field?

A. That particular series of publications is intended for the MNR field foresters plus the FMA holders in northcentral and northwestern region.

Q. So not only this specific one that we filed here today dealing with these zircon cones would go out, but this series of publications would routinely be sent out to the field?

A. That's correct.

Q. Thank you.

MR. WAITO: A. The second method of direct seeding, I have referred to as ground seeding mechanical. And where ground seeding by mechanical means is used, the most commonly used piece of equipment is the Bracke scarifier. I don't have a slide of it, but on page 404 of Document No. 1, Panel 11, there is--

Q. That's Exhibit 532A.

A. --there is a picture and a description of the Bracke cultivator scarifier/seeder. If you have your copy handy, if you wouldn't mind turning to page 404, I would just like to make a few comments about this piece of equipment.

MS. BLASTORAH: That is reference No. 12

to Mr. Kennedy's material, Mr. Chairman, and he will be speaking about this piece of equipment as well.

MR. WAITO: The reference material contains quite a detailed listing of how the machine operates, where it should be used and kind of results to expect. On page 409 there is a small section entitled Users' Assessment where it describes the advantages and disadvantages and, in particular, talks about seeding and I would just like to focus a little bit on a disadvantage.

If the seeding fails after normal application, we cannot aerial seed since the mineral soil exposure is too low. I have mentioned earlier that for the optimal -- the optimal amount of mineral soil exposure, or seedbed exposure for broadcast seeding or aerial seeding is 25 per cent. This particular piece of machinery certainly doesn't expose nowhere near 25 per cent of the gross area.

So if the seeding fails with this piece of equipment, the re reatment would be either seed by hand or possibly plant the area utilizing the site preparation that was created by the Bracke scarifier when it was doing the seeding.

MS. BLASTORAH: Q. And I believe on page 408 under other factors it indicates -- the material

indicates you cannot seed in very humid conditions, moisture interfaces with seed dispersal from seeding unit -- I beg your pardon interferes.

MR. WAITO: A. That's correct. The seeding unit has small holes where the seed comes out, of course, and there's a container that holds the seed and if it is very humid the seed will stick together and it just won't work. So there are limitations to using the equipment in the field.

Q. And, again, this is material that would be available to field foresters in making their selection of methods to carry out regeneration treatments?

A. Yes, it would. There are two silvicultural equipment catalogues that I believe all field offices have which contain the information that we have here on the Bracke scarifier. As Ms. Blastorah indicated, Mr. Kennedy has a video that will be showing how this equipment operates.

The third category for seeding is aerial seeding and that is the most widely used direct seeding technique. Most commonly used seeder is called a Brohm seeder and it's mounted on the belly of an aircraft either fixed wing aircraft or a helicopter and photo 2.2 is just a shot of what a Brohm seeder looks like

hanging from beneath an aircraft, you will note that there is snow on the ground. Aerial seeding using an aircraft is done in late winter or the spring, or it can be done in the fall.

It's a simple shot of a fixed wing aircraft flying over the cut-over. They fly at fairly low altitudes covering a swap with each seeding pass and, again, the silvicultural equipment catalogue which I just referred to contains information pertaining to this technique.

Q. And I believe your reference No. 2 would be another example of an excerpt from that catalogue?

A. That's correct.

What are the advantages and disadvantages of broadcast direct seeding as compared to other regen methods. Well, to begin with, the biggest advantage of course is the lower cost, much cheaper than tree planting and it does offer a measure of control over species that are established there more so than a natural regeneration technique would offer.

There are disadvantages to seeding. It is very site-specific, therefore, limited. There is a higher risk of failure than planting, for example, because after the operation is complete we really must

rely on nature to make it work. It does require appropriate mineral soil exposure, particularly with respect to broadcast seeding with an aircraft, you may have to expose a considerable amount of mineral soil to ensure good stocking levels.

Another disadvantage to seeding is if you do get a good catch, you do get good stocking you may require juvenile spacing if the trees are too dense, and this can offset the initial economic advantage of seeding. And, of course, broadcast seeding in particular, which is the most widely used seeding technique, requires a lot of seed and seed is costly and difficult to obtain particularly in some locations and particularly with respect to black spruce which is another reason why a black spruce -- or broadcast seeding, aerial seeding of black spruce is not as attractive as seeding jack pine.

Q. How is that seed obtained, Mr. Waito?

A. The seed is obtained through the Ministry's tree seed collection program and I believe Mr. Baker will be discussing that in his evidence.

Q. You indicated that you need a lot of seed to carry out this activity. Could you give us an idea what kind of magnitude you are talking about?

A. Well, for jack pine a common

prescription for broadcast seeding or aerial seeding is 50,000 seeds per hectare. That can be reduced if you are using the Bracke cultivator. Common prescription there is around 1,700 to 22,000 per hectare.

With black spruce I had indicated earlier that the feeling seems to be that you have to increase the rate and I think they are looking at doubling the amount of seed so you'd be looking at 100,000 seeds per hectare. That would translate into a lot of nursery stock if you were growing it in a greenhouse or if you were growing it at a nursery.

Slide 2.6 is an early shot I guess of an area that was clearcut in 1975. There were two site preparation techniques applied here; one was a light prescribed burn to remove slash. It was then followed up by a mechanical site preparation technique using barrels and chains in 1976 and the area was direct seeded in 1977, this was near Atikokan. This particular area actually was hand seeded, it wasn't seeded with an aircraft, it was hand seeded and the photo was taken in 1981.

Now, this is the same cut-over five years later. This is photo 2.7 and I think from the photo it's pretty green. You can tell that there was a pretty good catch there. I spoke about the need to do

juvenile spacing and in photo 2.8 which we have on the screen now I have a shot of a worker using a Huskavar and a brush saw to remove or reduce the stocking level or the density level in this particular plantation.

I think you saw this slide this morning and you were warned that you would see it in Panel 12 I think, but again just to demonstrate the clumping that you can get with hand seeding and you can get similar concentrations of seedlings with broadcast seeding as well.

Q. And I think at the time Mr. Hynard showed that slide he indicated that a tending treatment had been carried out. Would that be the type of thinning that we just - I believe it was spacing you indicated was being done with the brush saw. Would the same technique be used in this case?

A. Yes, that's right. Photo 2.10, again it's the same area, it's viewed after the spacing. You see a little more blue sky through the tops of the trees that are relatively around 15 feet tall, that is five metres I guess. Three metres -- five metres. Juvenile spacing is quite expensive.

Q. Just before we leave seeding, Mr. Waito, I believe I asked you what the magnitude of the number of seeds would be and you indicated the average

prescriptions for both aerial and ground seeding.

Could you tell me those again? I think I may have either misheard you or my note was incorrect as to the numbers you said per hectare. How many was it for ground seeding?

A. For ground seeding I believe it's between 17,000 and 22,000.

Q. Thank you. I had written down 1,700. I may have been incorrect. Would you please describe the second method of regeneration now which was -- you have indicated is planting?

A. Yes. Tree planting I think is what most people probably think of when we talk about reforestation. I think in MNR people either think of us as conservation officers or fighting fires or planting trees. So this particular topic I guess is close to all forester's hearts.

Tree planting is the most costly in the regeneration options. You must take into consideration the cost of stock production, the planting operation, site preparation, et cetera. It does offer the greatest control for species and spacing. Tree planting offers competitive edge over seeding which is necessary on certain sites and, as you've heard from Mr. Hynard already, and based on my

comments on seeding, planting may be the only practical method on some sites if conifer regeneration is the objective.

Q. Could you give an example of that, why you say that?

A. A lot of my experience as a unit forester was in Manitouwadge, I think you heard that this morning. At least you heard the Town of Manitouwadge, and we are smack dab in the middle of the boreal mixed wood forest and a typical stand that I had to deal with could be characterised by poplar 40 per cent, balsam fir 30 per cent, black spruce 20 per cent and smattering of white spruce.

In effect, you would have a hardwood working group with actually more conifer than hardwood. And if the objective was to grow conifer trees on that site after it were cut, black spruce for example, the only way of doing that and being successful would be to plant it. Attempting to do some form of natural regeneration for black spruce would be a failure, it wouldn't work. So that is the kind of site I was thinking of.

I think planting is considered by most foresters to be the lowest risk option and, therefore, it's the preferred one in most cases.

Q. And I believe we had an interrogatory that related to that particular issue?

A. Yes, we did. I believe it was Forests for Tomorrow Nos. 5 and 6.

MS. BLASTORAH: Yes. We'd like to file those at this time, Mr. Chairman.

THE CHAIRMAN: Exhibit 545.

MS. BLASTORAH: We have them stapled separately, so perhaps they should be marked separately. It's Forests for Tomorrow No. 5, and that will be Exhibit 545 I believe?

THE CHAIRMAN: Yes. Do you want that as A, or do you separate numbers?

MS. BLASTORAH: Separately I think would be simpler.

THE CHAIRMAN: Okay 545.

MS. BLASTORAH: And Forests for Tomorrow Interrogatory No. 6 would then be 546?

THE CHAIRMAN: That's correct.

MS. BLASTORAH: nd in this case we have not made copies of the interrogatories for the Board -- or for the parties rather, they are already have copies and we are not going to be referring to these in any detail, so I just have copies to file with the Board. (handed)

---EXHIBIT NO. 545: Forests for Tomorrow, Interrogatory Question No. 5 (Panel 11).

---EXHIBIT NO. 546: Forests for Tomorrow, Interrogatory Question No. 6 (Panel 11).

MS. BLASTORAH: Q. Mr. Waito, you referred to the related activities of stock production -- or the related activity rather of stock production. Could you please describe the various types of stock available for planting and some of the related activities?

MR. WAITO: A. Photo 1.1 is a slide depicting bareroot stock and container stock that is used in the artificial regeneration program. At the left of the screen we have a one-year-old black spruce paper pot seedling with the paper still around the root system.

Next to it we have a three-year-old bareroot black spruce seedling followed by a four-year-old whited spruce seedling, a two-year-old bareroot jack pine seedling, and a one-year-old jack pine container stock grown in paper pots.

I think the point to be made here is to point out the difference in size not only in height but in robustness or caliber between the bareroot stock and the container stock because there are reasons why a

forester may prefer one particular stock type over another. So there are some pros and cons to either of the two stock types which I will talk about a little later.

The other container type that's used in Ontario, particularly in the northwest region, is the Spencer LeMaire container. We have here in slide 3 -- excuse me 1.10, an example of a book of Spencer LeMaire container seedlings. These seedlings would be extracted from the book before going out into the field for planting.

Slide 3.2 is a shot of the interior of the Thunder Bay cold storage facility. When dealing with bareroot, one of the forester's biggest concerns is stock quality and, of course, you have a seedling that has been lifted from the ground, it has been packed in a plastic bag and put into a box and it now becomes a perishable good much like a lettuce that you see at the local IGA or Safeway. And one way of ensuring that the quality of that product is kept high is to store it under low temperature in a temperature controlled conditions. One of those ways of course is to use a cooler.

Slide 3.4 is just a shot of a picture of a reefer van, refrigerated reefer van loading up

bareroot seedlings at the Thunder Bay storage facility for transport to the field for tree planting.

Again, the important point here is it's a refrigerated van to maintain the temperature inside the van at just above freezing.

MS. BLASTORAH: Mr. Chairman, while that slide is up maybe I should just warn you, that is what we are going to be moving in when we take the hearing on the road.

MR. FREIDIN: But we will turn the temperature up.

THE CHAIRMAN: You mean, the Board rides inside the back, is that what you mean?

MS. BLASTORAH: Depends on whether you want to work or not. I guess we could set up a desk back there for you.

MR. WAITO: Another technique to help maintain stock quality of bareroot stock is using snow caches and I believe the Board may have seen at least the outside of a snow cache this past winter, probably just a pile of snow with some sawdust around it. Quite possibly you will see a snow cache being opened up this spring on the site visit.

MS. BLASTORAH: Q. There is a diagram of a snow cache or how a snow cache is constructed which

is Figure 4 on page 184 of the witness statement.

MR. WAITO: A. I had thought about putting it up, but in the interest of brevity...

Container stock on the other hand is not quite as perishable as bareroot stock, you still have to be quite careful when you handle it, you ship it around, but because the root system is contained within a container and can continue to grow you don't have to be quite as concerned about keeping it at a low temperature.

So photo 3.5 is just a picture of a field -- an area in the bush adjacent to the cut-over that is going to be planted where container stock has been shipped to from the nursery it was grown in and it's just arranged there. The stock would then be picked up from this location and distributed throughout the planting site.

Photo 3.6 is just a shot taken adjacent to the storage area or in the vicinity of the storage area where tree planters have taken the trays of Spencer LeMaire seedlings and are exacting them from the books and loading them into their planting bags for planting in the field.

And, again, I hope Board will see -- I suspect the Board will see this type of operation in a

couple of weeks.

Tree planting is not very sophisticated. You use shovels not unlike possibly a garden shovel although this one has a little bit longer blade on it. It's pretty straightforward work.

This planter here in photo 3.9 is carrying a Puttyputke. This planting tool originated in Finland, I guess it was, as a lot of our equipment. It was originally designed to plant the paper pot seedling. The planter is planting an area that appears to have been prescribed burned has a carrying tray to carry the trees in.

The advantage of a Puttyputke is the planter doesn't have to bend over each time a tree is planted. The disadvantage of the Puttyputke is they are quite expensive and very prone to mechanical breakdown. While some are still used, shovels have essentially replaced the Puttyputke.

Q. Mr. Waito, you indicated that tree planting is a pretty straightforward activity and you also indicated with regard to this piece of equipment that you don't have to bend over with it. I take it with a shovel you might have to bend over, it would be a little more laborious than using something like this?

A. Yes, it would be.

Q. So by saying that tree planting is straightforward, did you mean to imply that it's an easy activity?

A. Definitely not an easy activity. I say straightforward in that using a shovel is pretty straightforward. The planter still is required to select the proper micro-site, ensure that the tree is planted properly, good quality, because really the future of that tree being planted rests in his hands -- his or her hands, but from the point of view of using a shovel it's pretty straightforward.

Q. Mr. Waito, you indicated that the planters select micro-sites or have to try and put the seedling on an appropriate site. Is any training provided by the Ministry in that regard?

A. The Ministry doesn't provide training any more but almost all of our, if not all of our tree planting is done by tree planting contractors now. When I was involved with the tree planting program before contracting came into being in a big way, we had been contract planting for quite a few years, we provided considerable training on an annual basis with the tree planters when they would first come into the district.

Most of the contractors that are hired by

the Ministry have experience in tree planting and in fact it's a condition of tender that they have had experience in planting certain amounts of trees before they can bid on the job. So the contractors themselves have experience and are expected to provide the training to their planters to ensure that the trees are properly planted.

Q. And is there any step taken by the Ministry to ensure that that is in fact done, that the trees are in fact planted to an appropriate standard?

A. Well, exactly. The Ministry has a very large contract with a great number of appendices in it, one of which discusses or describes tree planting quality and what constitutes a properly planted tree. And the Ministry conducts extensive quality assessment surveys during -- throughout the planting of the trees to ensure that they are properly planted.

Q. I believe one of the photos that you have not included today, but which is contained in your material, actually refers to that kind of assessment; am I correct in that?

A. That's correct. And also in Panel 16 I believe in the Statement of Evidence there we have filed as references examples of tree planting

assessment, results and procedures.

Q. Thank you.

A. Almost at the end of the slides. Photo 3.11. This is just a shot of a newly planted black spruce container Spencer LeMaire seedling. It's about 12 centimetres in height. Right beside there is some lesser vegetation that's about four times as high. I hope that little seedling makes it.

My last photo is a picture of foresters up to their hard hats in new forest and, to borrow from Dr. Euler, this is a situation that foresters like being in asmuch as moose. This photo was taken near Atikokan and the area itself was site prepared in 1980. It was planted with black spruce bareroot stock in 1981 and the area was tended twice actually with 24-D in '81 and '83.

Just behind the foresters you will note a more yellow/green colour, and that's some natural jack pine that have established themselves. And in talking with the forester, he indicated that this stand should develop into a conifer dominated forest type with a minor component of poplar.

Q. And I understand there was a correction to the description of this particular photo in the witness statement?

A. Yes, there was. Actually there is about three corrections throughout. In this particular case, I think the photo was indicated as being taken in '81. It was taken in 1986, this particular photo.

And going back to slides 2.7 and 2.8. In slide 2.7 it reads: Same seeded area shown in photo -- that should be photo 2.6 not 2.5. And in photo 2.8, the description reads -- or should read: Dense jack pine regenerated by hand seeding, same seeded area as photos 2.6 and 2.7 rather than 2.5 and 2.6.

MS. BLASTORAH: And that has been corrected in Exhibit 543, Mr. Chairman.

Q. Mr. Waito, you indicated earlier that you were going to discuss how the forester chooses, or factors that might affect the choice between the use of container stock as opposed to bareroot. Could you do that now?

A. Yes. If you would like to maybe turn off the slide projector, that's the end of the slides.

As I indicated earlier, there are two types of planting stock that can be used in the tree planting program, what I have called container stock and what I have called bareroot stock.

I think most foresters would agree with me that bareroot stock because of its size, because of

the caliper, the height, the robustness of it is preferred for planting on more competitive sites. The size of the seedling gives the seedling a competitive edge over any competition that might come up during the early establishment phase.

Container stock, on the other hand, has some advantages as well. It can be used to extend the planting season because it is not as perishable as bareroot stock. Container stock is generally more flexible because of the fact that you can extend the planting season and you don't have to be quite as careful with how it is handled.

An advantage to container stock over bareroot is it takes very little time, relatively speaking, to produce container stock. It can take as little as 14 weeks to produce a crop of containers for shipping, whereas with bareroot it requires three to four years.

Q. On page 178 of your written material, you state that:

"The availability of appropriate planting stock is critical to a successful planting program."

Do shortfalls of stock ever occur and, if so, how do you deal with those situations?

A. Well, they certainly do occur sometimes and sufficient planting stock may not be available for a number of reasons. There may be over-wintering losses at a nursery, there may be other nursery cultural problems. By cultural problems I am referring to, when stock is grown either in a greenhouse or in an open bed, as you do with bareroot, you have to contend with funguses, insects, other diseases, mice, grasshoppers, and they can all take their toll on seedlings which may result in a shortage when it comes time to plant. Of course, there are funding limitations. We have already heard a little bit of discussion about that.

Shortfalls can be dealt with in several ways. If a shortfall results from something unpredictable, a catastrophic event, if I can characterize it that way, such as over-wintering losses would be dealt with at the annual work schedule stage. There is some flexibility to transfer stock into substitute species, and Mr. Baker I believe will discuss how this is done.

There is some flexibility to transfer or substitute container stock for bareroot stock and vice versa. There may be an option there to hold the area that was intended for planting over until the next year

until sufficient stock can be acquired, it may necessitate spraying with a herbicide to maintain the site. There may be an option there to substitute seeding for planting if that is an option and if the sites will permit it.

The regeneration options for a particular site are listed in the silvicultural groundrules and they will usually list the priority, with planting usually being indicated as the preferred option where conifer regeneration as the objective.

Q. Mr. Waito, just on that point, you indicated I think in your last point there that you could substitute seeding for planting where that was appropriate. Would one of the constraints on doing that be the sort of thing you spoke of earlier when you talked about per cent of mineral site exposure?

A. Precisely. Whether or not seeding is a viable alternative would depend on the site conditions that you were dealing with.

If your site preparation for planting was using the Bracke scarifier, for example, you would not have sufficient mineral soil exposure to aerial seed using an aircraft. On the other hand, you may have sufficient mineral soil exposure to go and hand seed or spot seed using zircons. So there are -- there may be

options at the annual work schedule stage that could be explored to offset a temporary shortfall of nursery stock.

Q. Could you give an example of that, of when that -- how that has been dealt with, if you have an experience that you can relate?

A. I have a pretty good example. In 1987 - I think maybe all of Ontario might know about this - we experienced fairly large container stock losses in Thunder Bay, this was the first year I had moved into the region, and we lost I think approximately six million seedlings both at the private growers and at our own nursery.

Well, coincidental with that we experienced an over-production of bareroot stock at the Ministry's nursery. The loss of stock only started to show up around the end of April. Tree planters were arriving at the site and were literally getting ready to ship trees that were dying overnight.

So we called an emergency meeting of all of the district staff and all the company reps and worked out the best solution and, in the end, with using some of the -- as much of the surplus bareroot stock as we could, as well as bringing in some surplus stock from the northwest region, we were able to offset the loss

of six million containers so that the entire planting program was only down 10 per cent, and that's the kind of flexibility which you have to maintain.

Just a converse of that happening. Mr. Martel asked yesterday about three million trees lost in or buried or whatever, disposed of. I don't know if the number was three million, but I do know that there was a surplus production of seedlings last year and maybe I could talk just a little bit about that.

When container stock or bareroot stock is grown in a nursery, it is usually grown to a particular target and as with growing cabbages or grain or whatever, if you have a target to grow ten cabbages, you usually will seed twelve just in case two die. Well, the growers, our own nursery as well, seeded and grew trees to a particular target and just the opposite happened last year as to what happened in 1978. They had very few losses and the surplus seedlings that were -- had been grown to offset any losses that might have occurred were in fact surplus.

It would have been very nice to have planted those seedlings, but just having the trees there didn't make it possible. We didn't have the funds to purchase the trees, the area that may have been required to plant them in may not have been there

in all cases, so we may not have had area site prepared, and we didn't have the funds to plant the trees.

So having an over-production of seedlings I think is consistent with growing any kind of agricultural group, you never seed to grow exactly the number that you are targeted for, you always over-seed and if you're lucky you're right on and you ship exactly what survived through the winter.

THE CHAIRMAN: Just out of curiosity, what was the reason for the loss of the six million up here?

MR. WAITO: There were a number of -- a couple of factors. Primarily I think there were some cultural problems at the private growers. I mentioned earlier -- I talked earlier about cultural problems and these kinds of things that can happen.

In this case there were insufficient root systems on some of the trees which predispose them to early spring stress. We had a very early spring that year and the drought conditions, drying conditions that the trees were exposed to very early on contributed to that mortality. So it was a combination of cultural problems that the growers experienced as well as climatic factors at the time.

MS. BLASTORAH: Q. And I believe you mentioned that there were several types of situations that could give rise to shortfalls and I kind of sidetracked you here. Had you completed what you had intended to say about that?

MR. WAITO: A. No. We were focussing on stock of course, but some of the other factors are equipment availability, manpower, strikes. For example, last year Kimberly-Clark experienced an unfortunate time in Geraldton where they went on strike and we had to wrestle with stock that was being shipped to Kimberly-Clark for planting and that problem.

Weather conditions can play -- can affect whether or not planting gets done or where it gets done. We have a late spring this year. I was talking to Max Squires earlier today and he talked about the ground still being frozen, tree planting not starting for a while yet.

Of course frozen ground is one thing, fire hazard is another. If we get a very hot summer -- if we were to have a very hot summer or hot spring, it's not unconceivable and it has happened in the past where planting operations have been shut down. And if you have got bareroot stock sitting there, you can't hold it indefinitely. So that can have an effect, you

may have to shift things around.

Of course the harvest level is another critical factor. If for reason of strike or change of plans areas haven't been harvested and you have been planning to plant trees there and have ordered them three or four years hence or prior to that, you may have to do some juggling at annual work schedule time. And, of course, annual funding levels can have an effect too.

There are other -- there may be other anticipated limits on stock availability, for example, and -- as a result of long-term funding considerations, and I am talking here, we have experienced a levelling off of the amount of stock that we have been planting in the last couple of years and such a long-term lack of funding, if you will, for tree planting can be taken into account in the timber management planning process.

A shortage of -- a long-term shortage of nursery stock doesn't affect your silvicultural groundrules. Your silvicultural groundrules are based on the best current science. However, such an event as a projected long-term shortfall in funding or long-term shortfall in availability of nursery stock can be included in the strategies and objectives sections in a TMP or discussed in the problems and issues section.

Q. And how would that affect operations under that timber management plan?

A. Well, for example, if there is going to be a long-term shortfall, the right thing to do in my mind is to plan to still do the best job of renewal that you can, and an alternative may very well be to look at natural regeneration methods which require modifying the cut, strip cutting, for example, or block cutting.

And it is important if you are going to to do modified cutting that you plan well in advance to do it. It is not the kind of activity which you can just start and stop at the drop of a hat.

So if natural regeneration is one of the options for the particular site that you don't have planting stock for and, as an acceptable option within the silvicultural groundrules, then we have to take account of that reality and plan to implement those alternative methods if possible.

Q. And where would that type of planning show up in terms of the timber management plan?

A. It should be -- it should show up I would say in a discussion of objectives and strategies and problems and issues and, of course, it is all reflected in the silvicultural groundrules which guide

the type of activities that are going to occur on the various sites from a harvest and renewal perspective.

Q. And when you say it would show up also in the silvicultural groundrules, you did indicate earlier that those are based on best current science.

Given that comment, how do you anticipate that such long-term shortfalls would be handled through the silvicultural groundrules?

A. Well, what it would mean is the preferred option may still be to plant, but if a second option is to modify cut, then the forester would make the choice of doing the second option. And that carries with it -- may carry with it a risk of failure that he would have to live with.

Q. And I believe Mr. Hynard indicated - but perhaps you could just confirm this for me - the options that are set out in the silvicultural groundrules, those would all be acceptable options for the site conditions indicated in the groundrules?

A. That's correct.

Q. Thank you.

A. I believe we have an interrogatory now that we would like to file, OFIA Interrogatory No. 14.

MS. BLASTORAH: That's correct, Mr.

Chairman. Again, I have copies for the Board.

THE CHAIRMAN: Exhibit 547.

MS. CRONK: I'm sorry, what number was that, please?

THE CHAIRMAN: 547.

MS. CRONK: I actually meant the interrogatory number.

MS. BLASTORAH: No. 14.

MS. CRONK: Thank you.

---EXHIBIT NO. 547: OFIA Interrogatory No. 14.

MS. BLASTORAH: Q. Mr. Waito, at page 147 of the witness statement, you state that:

"The forester must attempt to strike an acceptable balance among the various options recognizing that it may not always be possible to do the preferred option."

And I take it by that you were referring to the options set out in the silvicultural groundrules?

MR. WAITO: A. That's right.

Q. In making that statement, to what sort of situation were you referring?

A. I was referring to, and I think I have already touched on it, a situation where if there

is a shortage of funding and there isn't sufficient resources to plant all the planting stock, that a balance must be struck between the renewal methods that are being used, artificial versus natural, low-cost artificial and high-cost artificial and, in addition to a balance within the renewal program, what flows from that is a balance within the entire timber management program.

So as I indicated earlier, timber management involves other activities. We are involved in management planning, we carry out compliance and effectiveness monitoring, we do tree improvement, wood measurement and, as I indicated earlier, technology development and transfer, and that's a short list.

So if we are going to meet all of our obligations within timber management, a balanced program I think is the proper way to proceed.

Q. Who makes the decision regarding the particular artificial regeneration method to be used on a particular site?

A. Well, the unit forester makes the decision. He selects from among the acceptable options set out in the silvicultural groundrules for the particular site type and objectives and, as mentioned earlier, the choice of option may be affected by many

factors and some of those are stock availability, manpower, harvest level, weather conditions and, of course, funding.

I believe at this time we want to file an additional interrogatory, two of them, MOE No. 11 and 12.

MS. BLASTORAH: That's correct, Mr. Chairman. And, again, we aren't going to take the time to go through them, we will just file them at this point.

THE CHAIRMAN: Okay. Two separate exhibits?

MS. BLASTORAH: Yes.

THE CHAIRMAN: Exhibit 548 and 549 respectively.

MS. BLASTORAH: Okay. So MOE Interrogatory No. 11 will be Exhibit 548 and MOE No. 12 is 549.

THE CHAIRMAN: Correct.

---EXHIBIT NO. 548: MOE Interrogatory No. 11.

---EXHIBIT NO. 549: MOE interrogatory No. 12.

MS. BLASTORAH: Q. Mr. Waito, you indicated on page 146 of your statement of evidence that there are essentially five factors which are weighed when selecting an artificial regeneration

method. Could you briefly describe their role?

MR. WAITO: A. Yes, I listed five factors: Management objectives and standards, silvical characteristics, site preparation -- or site conditions, pardon me, economic efficiency of alternative methods, and the probable success based on past results.

I don't intend to discuss each one in detail. The five factors I have listed are not unlike those discussed by Mr. Hynard already in Panel 10 and I believe, to some extent, in Panel 11. I will make a few comments -- brief comments about some of the factors though.

Q. Would you briefly describe what you mean by the first factor, management objectives and standards?

A. Of course in timber management planning one of the main objectives is to grow timber. The growing of timber or producing timber not only involves harvesting but also involves renewal.

The objectives pertaining to a supply of timber will have a direct bearing on the renewal program. It can influence the choice of species as well as the method of renewal. Of course, regeneration standards are part of the renewal package.. Both the

objectives and standards being contained in the silvicultural groundrules.

The second factor that I have listed is silvical characteristics and it is extremely important. Mr. Hynard stated that the silvical characteristics of trees are most important. This is very true, as they set the stage for the consideration of the remaining factors.

The next factor, site condition, has already been addressed by Mr. Hynard.

Q. Your fourth factor is economic efficiency of alternative methods. Could you explain that factor a little more fully?

A. When I wrote the evidence -- prepared the evidence, I had essentially two ideas in mind. One was the larger scale, the comparing of or consideration that goes into making a choice between high-cost artificial versus low-cost artificial versus natural regeneration. So the economics of that and also at a more local level, local scale when choosing between, for instance, different pieces of site preparation equipment or different site preparation techniques, the cost of using one particular technique or using a particular piece of equipment over another piece can vary considerably and can enter into the forester's

decision when he is deciding which particular piece of equipment to use.

I think Mr. Kennedy will be addressing that sort of thing in a little more detail.

MS. BLASTORAH: Perhaps, Mr. Chairman, just before Mr. Waito goes in to more detail on this point, this would be an appropriate point for a break.

THE CHAIRMAN: All right. We will take 20 minutes at this time.

Thank you.

---Recess taken at 3:00 p.m.

---On resuming at 3:35 p.m.

THE CHAIRMAN: Thank you. Be seated, please.

MS. BLASTORAH: Mr. Chairman, just before we go back into the evidence, I have a couple of matters I would like to deal with. I heard through the grapevine that there may be a change to the timing of when we will be finishing next Wednesday the 10th. Am I correct in that? You had indicated yesterday that we might be sitting a full day.

THE CHAIRMAN: Right. We did some checking and evidently the last flight out to Sudbury is something like 4:15 during the day. What we are suggesting is that we might sit until 2:30 or three

o'clock for everybody else and that might necessitate people packing and getting ready to go and that should still give everyone enough time to get to the airport for the 5:10 flight going to Toronto and Mr. Martel will be able to make his flight as well.

MS. BLASTORAH: And, of course, I can't make any promises because I don't know what is going to happen with the hearing -- or with the motion on Monday, but I think there's a very good chance that we will finish our evidence-in-chief not that late in the day on Wednesday. So that I think may work out very well in the end.

THE CHAIRMAN: Well, if you finish your evidence-in-chief for this panel Wednesday, then we will just break when you finish.

MS. BLASTORAH: That is what I was...

THE CHAIRMAN: There is no sense starting cross-examination before a motion.

MS. BLASTORAH: That is what I was going to ask especially when we have a long weekend.

THE CHAIRMAN: Not just that, but who knows when we will get back to the cross-examination.

MS. BLASTORAH: Yes. And one other matter in relation to the terms and conditions -- the Ministry's draft terms and conditions or submissions.

We would like to ask for an extension on filing those to the 19th of May. They were to have been filed I believe at the beginning of this panel, and that is Friday the 19th. Would that be any problem for the Board?

THE CHAIRMAN: No, that won't be any problem. We don't feel that anybody will be prejudiced by this short delay because the other parties don't have to have theirs in until the conclusion of your case.

MS. BLASTORAH: I am sure you can appreciate what with the motion coming up and so on there has been a great deal of material to prepare. Thank you.

Q. When we left off before the break, Mr. Waito, you were talking about the economic efficiency of alternative methods and how that relates as a factor to the choice of artificial regeneration methods. Could you continue where you left off.

MR. WAITO: A. That's right. I would like to move into a particular topic area here that has been briefly alluded to in some previous testimony and that is the topic of prime site management.

I believe the concept was indirectly referred to by the Chairman and by Mr. Martel during

evidence of Panel 4 and it was briefly discussed by Mr. Hynard and Mr. Greenwood during cross-examination by Ms. Seaborn during Panel 10.

Prime site is a term which has come to be used to describe a management approach which has been used by foresters to rank sites for the purpose of directing investments to those sites which will give the overall highest return on investment.

There are a couple of basic factors when I think of prime site that come to mind that are used in determining what is a prime site. The first one I described was a biological factor or the biological factors. And essentially that's the capability of a forest site or a piece of geography out there to supply moisture, nutrients, et cetera and, hence, to grow trees from a forester's perspective, of course, are interested in growing trees.

Q. How can a forester describe that capability?

A. This capability can be described in a variety of ways. Soils descriptions for example, soils maps. These would include the detailed soils maps, they may include surficial geology maps at a larger scale, it includes FRI descriptions which provide a description of forest stands and provide a certain

amount of detail with respect to those forest stands.

There are lands form classification maps which can be used. We have growth and yield information, for instance, Plonski's yield tables. There are site index tables which are tables that reflect volume at a certain age and reflects the productive capacity of species.

We have our forest eco-system classification systems. There is one already in place for the northern region, one due out hopefully this spring for the northwestern regions and, of course, all of this biological information is reflected in rotation age and species size.

Q. You mentioned that there were two components in your mind. Could you describe what the second one is?

A. The second component I would describe is the economic component and it's quite a broad class. I suppose whoever you talk to about prime site might have a number of different components, but I am a lumper rather than a splitter and I would describe the second one as the economic component.

And some of the factors that would be in included in this list might include access consideration, for example distance from the mill of a

particular site, how far away is it. Another aspect of access of course is local access problems. It may be close to the mill, but because there are no roads or it's a lowland area, roads can't be built, it may affect the primeness of that site. Product value is another economic element that might enter into consideration. The rotation period and its impact on a particular economic analysis might play a role from an economic perspective.

Of course, the wood supply situation for a particular mill might play a critical role in an economic analysis of prime site. And, of course, there is a couple of very simple ones, simply cost of treatment, we talked briefly about that and, of course, the cost of harvesting.

Now, this list isn't exhaustive but I think it gives an idea -- an indication of the kind of economic elements that could be included in a prime site discussion.

Q. One of the things you mentioned there was product value. Could you briefly explain what you mean by that?

A. Well, for example, the value of a particular product such as saw logs versus that value -- the value of another species for pulp and

paper reasons or veneer depending on what that product is worth, either you could look at it from just a Crown dues perspective where softwood is more valuable in terms of the Crown dues that are paid, or you can look at it from the point of view of value of end product. Currently pulp and paper sells for I think six or $700 a tonne and a thousand board feet of lumber is considerably less.

So, you know, the end value there of one product over another may influence your economic decision or your discussion.

Q. In your evidence you state that prime site management is not a new concept to foresters. Has it been applied in the past and, if so, how?

A. Well, I believe it has and as managers we always have to make decisions as to where we are going to harvest, where we are going to spend our money, on silviculture. And in the course of arriving at the decision, many of the factors that I have described briefly here have been considered by foresters in the past.

And, as well, there may be others that have been considered, but depending on a particular situation would be more or less important and be given more or less weight depending on the circumstances.

Q. You state in your evidence at page 168 that the concept of prime site management is becoming more formalized. Could you explain what you meant by that statement?

A. Well, the manager today is faced with having to deal with a number of forces, I believe, call them forces. There is intense competition for resources to practise timber management in an atmosphere of government restraint and, at the same time as resource managers, we are acquiring more information about and a better understanding of our resources and will continue to do so.

And I think a good example of that is our forest eco-system classification system which can be used to describe in much greater detail the elements of a particular site, the biology of a particular site in that forest eco-system classifications are relatively new in MNR.

I think what we are doing now is essentially what we have always done as managers. Though really what prime site is, it's a catch phrase or a name that has been applied to a concept that we have used in the past but just never tagged with a handle before.

Now, the mere application of a catch

phrase or a name doesn't change anything, but really it's an aid I guess to help us communicate to people what we do and what we take into consideration and it raises the level of awareness of what we do.

Formalized probably wasn't the best term. Really we are, I believe, getting more sophisticated in our ability to aplly prime site management and as a result should be getting a better return on investment.

Q. The last of the five factors you listed in your material is past results. Could you expand on what you mean by that term?

A. Past results. Mr. Hynard this morning discussed past results briefly and he described how he as a unit forester viewed past results and used them to assist him in his silvicultural program and he described ideas such as observation, field visits, discussions with other foresters and technicians.

There are other sources that we can obtain past results information from. The technology development unit in Thunder Bay, as well as in Timmins, are putting out technical notes and there is an example of that filed already, the note on zircon seeding which in a fairly formal way takes into account information on past results of particular a technique and transfers that information goes to the field. And

that is one of the major roles of the technology development unit.

Of course, we have access to library material and research notes, other research notes. There is, I think, a fairly constant flow of this kind of information across the unit foresters' desks on a weekly basis.

The area that I would like to spend a little bit of time discussing is the area of data collection. I have personally had occasion to use the sources of information that I have just described and before getting into data collection, just to indicate as a unit forester and a supervisor, we made it a practice annually of choosing a particular district or region where past practices had been conducted that were of interest to us, may have been useful to us in our own district, for example on the Steel River Crown Management Unit where Dave Gordon who was the unit forester at the time, if you remember Dave, was interested in doing some strip cutting, some modified harvest cutting on his unit.

And we hadn't done very much in the district up until then and we were quite interested in the technique for strip layout, and also interested in what kind of site preparation would be appropriate

under those circumstances.

So we arranged to visit modified harvest cuts that had been done in Hearst and to view winter shear blading operations that were being undertaken then.

As I said, each year we tried to make it a point of visiting various districts and regions to gain and learn from the experience from other foresters.

Q. In your experience, is that something that is fairly commonly done by other foresters as well..

A. I think it is because we get the same kind of request from other foresters and technicians from other districts to come and visit something in our district. So I believe it's a fairly common thing, exchanging information -- a way of exchanging information.

Q. We heard in Panel 4 some evidence with regard to condition surveys. Is that type of information useful to foresters in making decisions among regeneration options and, if so, how is that information collected?

A. Well, it is very useful. In addition to the information that can be obtained by observation,

survey methods can be used to quantify results of past regeneration efforts.

Q. Would you briefly review the types of condition surveys which are carried out which might be useful to a forester in selecting among regeneration prescriptions?

A. There are three categories and I think they were covered to a certain extent back in Panel 4 which is almost a year ago, or better part of a year, and I would like to refresh I guess everyone's memory.

The first is survival assessments of planted trees, a fairly obvious one. The second is stocking assessment involves estimating the spacial distribution of regeneration on a cut-over. And a third category of surveys, termed condition surveys, were surveys that can be conducted on a formal or informal basis to identify the need for tending for example, or the need to protect from an insect pest.

Q. As a unit forester, did you use any of these survey methods?

A. Yes, I did. Survival assessments were a big part of our data collection program, if you will. Each year when I was a unit forester we did conduct certain level of stocking assessment and other

surveys were used helicopter surveys and ground surveys to assess the need for tending, for example.

At the time that I was a unit forester the concept of free to grow had not yet been born, so I was not involved in any free to grow surveys.

By way of just refreshing everyone's memory, a free to grow survey, there are three criteria for an area to be declared free to grow. It must be meet a minimum stocking standard, so it wouldn't require conducting a stocking survey at some point in time. The area must meet a minimum height requirement for the working group species, and the third criteria qualification is that the working group species must be essentially free from competing vegetation.

Q. Now, again in the evidence, I believe it was of Panel 4, we heard a description from Dr. Osborn of different types of stocking assessments or of a particular type of stocking assessment rather.

Is that methodology the stocking assessment methodology you are talking of here in terms of regeneration results?

A. No, it's not. I think Dr. Osborn was referring to assessing stocking of older stands and was based on estimating basal area using a prism. The kind of stocking survey I'm talking about here is one to

assess trees that are much younger than that, that don't have a basal area per se yet, too small in diameter. And there are a number of methods that can be used to assess the level of stocking on a particular area.

The one most commonly used by MNR in the past is a system in which plots of a pre-determined size or a fixed size or systematically laid out over the sample area. This methodology I believe was briefly described by Mr. Gordon in Panel 4.

Q. And, sorry, just so we are clear. The concept of stocking remains the same in that it's a measure of the spacial distribution regardless of the type of methodology; am I correct in that?

A. That's correct. In this case the methodology results in the production of a per cent stocking figure and I think I would like -- I would like to take a little bit of time because it is quite important that a forester be aware of when he's looking at a stocking per cent figure that he understand the particular assessment methodology that is used, he must relate the results obtained to the objectives and standards against which the results are being assessed and that the methodology is going to have an impact on the number that's produced and which is why it's

important to understand the methodology.

And I have got an example on an overhead that I would like to go through to demonstrate how a sample plot size, in particular the assessment methodology and sample plot size that is used today in Ontario, can affect the results and how the results should then be interpreted as to whether they are good, bad or indifferent.

Q. And, Mr. Waito, you indicated that it would be important for a forester to understand those numbers and be able to interpret them correctly. Would that be true of anyone, anyone looking at those figures?

A. Yes, it would be.

Q. And I believe we have copies of your overhead here to hand out.

MS. BLASTORAH: Mr. Chairman, we have a one page overhead that I'd ask be marked Exhibit 550.

THE CHAIRMAN: Very well.

---EXHIBIT NO. 550: Overhead titled: What Does Per Cent Stocking Portray?

THE CHAIRMAN: What are you calling it?

MS. BLASTORAH: It's titled: What Does Per Cent Stocking Portray.

MR. WAIT: What we have here on the

overhead are two examples and in example A what I have called the "perfect plantation" - perfect plantation in quotation marks, that is a theoretical perfect - I have the perfect plantation conditions where two metre by two metre spacing is the spacing prescribed to achieve a particular density and using that particular spacing regime we end up with a density of 2,500 trees per hectare. And based on the standard provincial assessment plot size of four square metres, we will have 100 per cent stocking.

So in example A 100 per cent success, which is in quotation marks, equates to 100 per cent stocking.

Now, in example B I have got what I call the real world plantation and the conditions are quite different than in example A.

In example B, the planting density prescription, and I checked quite a number of silvicultural groundrules to get a feel for what the average prescription is and it varies considerably, but 2,000 trees per hectare is a fairly regularly encountered planting density prescription.

Now, tree survival at year five obviously is not going to be a hundred per cent. As foresters we don't go out and plant trees expecting them to die. I

know when I was involved with tree planting I expected every tree to live, but I am a realist, they didn't all live. So I put in a factor of tree survival at year five of 80 per cent.

Now, spacing in the real world plantation is affected by many things and I have listed a few here: Logging slash, rock, stumps, small wet depressions or wet spots in the cut-over.

If one were to assess this real world plantation at year one where 2,000 trees per hectare were planted, one might very well come up with a stocking per cent of 65 per cent and there are a number of reasons why it is 65 per cent, because in the real world --

Q. Mr. Waito, maybe you could just step around the table and maybe even point at the screen itself, that might be easier. I think you are standing kind of in front of it otherwise.

A. In the real world plantation, of course, each four square metre plot may not have just one tree in it, it may have two trees in it simply because of the effect that logging slash may have had on the choice of planting micro-site. Subsequently, each four square metre plot may not have a tree in it, period, for these reasons.

So that when a stocking assessment is done, because not every plot is stocked, you end up with less than a hundred per cent stocking. At year five after you've had 20 per cent mortality, you've only had three trees die, it is not unreasonable to expect that stocking level may only be 55 per cent.

Now, in society today I think we've established in peoples' minds that a hundred per cent is -- a hundred per cent successful is good and 50 per cent is a failure. I know when I went to school if I got less than 50 per cent I didn't pass.

Well, at year five here we have a situation where the forester has got pretty darned good survival, he has got a large number of trees per hectare, he's at a point in time where we probably expected to be and yet the measure of success is only 55 per cent. In reality, in example B, he is maybe one hundred per cent successful, but the number that's been generated by the assessment methodology is only 55.

And in fact 40 per cent, which is our minimum stocking level for -- on many of our silvicultural groundrules, really equates to 74 per cent success. And I think another way of looking at it is 40 per cent in society today may be viewed by many as a failure. In fact, in this situation it may be a

failure but it is a very high level of failure, if you will, because it is almost second class honours.

The purpose of the whole overhead is really just to revisit stocking per cent and try to hopefully clarify for the Board that when viewing past results it is important that a forester look at the number, but it is also important that he understand what the number represents out there and not make a judgment as to whether what he has done is successful or not solely on the basis of a number.

I think at this time we wanted to proceed with some more information on past results and file an interrogatory from Forests for Tomorrow.

MS. BLASTORAH: That's right. We wanted to file a copy of Interrogatory No. 15 from Forests for Tomorrow.

THE CHAIRMAN: Exhibit 551.

MS. BLASTORAH: Again, Mr. Chairman, we have copies for the Board. This was a fairly large package of materials so we just made copies for the Board. I believe all of the parties received the whole package with the interrogatory, but if this isn't the case I will make some copies available.

---EXHIBIT NO. 551: Forest for Tomorrow Interrogatory No. 15.

MS. CRONK: Sorry, Mr. Chairman, to rise but I have a note that Forests for Tomorrow Interrogatory No. 15 has been marked as Exhibit 540, unless I am confused with these documents.

MS. BLASTORAH: No. I believe I indicated at the time that we marked 540 that it was only a portion of the material that is contained in this particular exhibit, 550. A number of management units or districts I believe were contacted to provide this type of information, Mr. Hynard's being one, and he had filed only his material.

THE CHAIRMAN: We have a note under that exhibit that it refers to the Minden results only--

MS. CRONK: Thank you.

THE CHAIRMAN: --under 540.

MS. BLASTORAH: And we included a copy of the interrogatory itself just for easy reference.

THE CHAIRMAN: Does this one include Minden as well, Ms. Blastorah, or does this exclude Minden?

MS. BLASTORAH: Mr. Hynard -- or Mr. Waito, perhaps you could...

MR. WAITO: It includes Minden.

THE CHAIRMAN: This is the whole package?

MR. WAITO: Yes.

MS. BLASTORAH: I believe that's not exactly the same material as what Mr. Hynard provided.

MR. WAITO: No. I have aggregated it for the eight districts, so I won't be speaking specifically to one district but to -- as a group.

MS. CRONK: I would just ask my friend in due course to provide a copy to the rest of us, those of us who haven't received a portion of it.

MS. SWENARCHUK: Can I ask if that overhead is part of the package, because we don't have it.

MS. BLASTORAH: I am just about to hand those out. Again, just for the record, Mr. Chairman, the package that was filed as exhibit....

THE CHAIRMAN: 540.

MS. BLASTORAH: No, 550, I believe, is the material that was sent to Ms. Swenarchuk in response to her interrogatory. The response entailed a summary of material that was received from a number of districts. That package went to Ms. Swenarchuk, as I indicated --

THE CHAIRMAN: You are talking -- sorry, you are talking 551?

MS. BLASTORAH: 5...

THE CHAIRMAN: This last one you just

handed out?

MS. BLASTORAH: I'm sorry, 551. I had the wrong exhibit number. That is the actual response that went out to the parties, to the interrogatory. However, that was a compilation of other material that was received, a number of tables and so on I believe of the type submitted by Mr. Hynard in relation to his unit and that was marked.

His results or the material he provided to Mr. Waito to prepare that summary is what was marked as Exhibit 540. So it isn't exactly the same in that sense.

I will check and see whether copies of the entire answer to the interrogatory, including the tables and so on, went out to all the parties, but it is certainly -- Exhibit 551 is the response that Ms. Swenarchuk received to her interrogatory, just so that nobody is concerned that we are presenting more information here.

MS. SWENARCHUK: So can I just clarify something you said a moment ago. Are you saying Mr. Waito's past results are based only on the Minden district or all the districts?

MS. BLASTORAH: No, all the districts. It is exactly the same as what we sent to you. And I

would now ask for a package of overheads to be marked as Exhibit 552.

THE CHAIRMAN: Okay.

MS. BLASTORAH: Mr. Chairman, we could just go through and mark the individual overheads as A, B and C and so on, Exhibitm 552A...

THE CHAIRMAN: Okay. This first one is A?

MS. BLASTORAH: Yes, that's correct, and it is headed Past Results.

THE CHAIRMAN: Okay.

---EXHIBIT NO. 552A: Slide entitled: Past Results.

MS. BLASTORAH: And, Mr. Waito, perhaps as you put the overheads up you could just read out the titles so that we can mark them 552B and so on in the record.

MR. WAITO: Fine.

MS. BLASTORAH: Thank you.

MR. WAITO: Okay.

MS. BLASTORAH: Mm-hmm.

MR. WAITO: Past results, and I will actually just read what's on the overhead.

When we received the information from the districts and subsequently forwarded it to Forests for Tomorrow, we were interested in compiling it ourselves

to try to come to some understanding as to what the information represented or what it was telling us, and in doing so prepared this analysis based strictly on the numbers that were given to us by the districts.

So in response to an interrogatory from Forests for Tomorrow, No. 15 for Panel 11, information on survival stocking and free to grow was collected from eight districts. The information reflects assessment sampling results of silvicultural work conducted on Crown management units from the period 1970s to the early 1980s.

The information on stocking and free to grow that is presented represents stand conditions at the time of the survey. Stocking levels will change over time as a stand establishes and develops. These results are just a snapshot of a dynamic new forest.

MS. BLASTORAH: Q. The next overhead you are putting up now I believe is Analysis of Past Results, Information Survival?

MR. WAITO: A. That's correct.

MS. BLASTORAH: And that would be Exhibit 552B.

---EXHIBIT NO. 552B: Slide entitled: Analysis of Past Results, Information Survival.

MR. WAITO: Dealing with survival first,

the results are these: For second year plantation survival ranges from 30 per cent to 100 per cent. 76 per cent of area assessed had survival percentages greater than 80 per cent, and 87 per cent of the area assessed had survival greater than 87 per cent.

The results are consistent with the Panel 4 evidence presented by Dave Gordon. They are presented here in a slightly different format than what Mr. Gordon did because they were collected in a slightly different manner.

MS. BLASTORAH: Q. Mr. Waito, just before you go on, could you just explain what you mean by the results are consistent with Mr. Gordon's evidence in Panel 4?

MR. WAITO: A. They are consistent in that Mr. Gordon's evidence information was provided by species and the information or the survival per cent was an average survival figure for those species and the average, depending on species, varied but it was usually in the mid to high 80s, 80 per cent survival.

So the information that we have here is consistent with that, in that most of the survival -- the information on survival, most of the results are in the mid to high 80s.

MS. BLASTORH: The next overhead which

will be Exhibit No. 552C is entitled Message.

---EXHIBIT NO. 552C: Slide entitled: Message.

MR. WAITO: The message I think is pretty straightforward. Survival results are very good when one considers some of the factors that can cause a tree to die, and I have listed a couple here.

Stress caused to trees during stock shipping and handling prior to planting and, of course, the impact and environmental factors such as drought, freezing temperatures and competition for light and nutrients has on seedling survival,

MS. BLASTORAH: Q. I take it, you said those are some examples, that wouldn't be an exhaustive list?

MR. WAITO: A. No, that's correct.

MS. BLASTORAH: The next overhead, which will be Exhibit 552D, is titled: Stocking.

---EXHIBIT NO. 552D: Slide entitled: Stocking.

MR. WAITO: In this overhead, beginning first by giving a little bit of information on what stocking is all about and stocking standards.

In general, there are some variation in stocking standards between regions and among timber management plans, depending on local conditions.

In Panel 4 I believe free to grow

standards for each of the regions was submitted in the Panel 4 witness statement and if anyone is interested they can check in there and see if there is some variation.

Stocking standards consist of a minimum stocking standard and an objective stocking standard. The minimum stocking standard for our working group species is 40 per cent. The objective stocking standard, which includes all desired or acceptable species, as well as the working group species which makes up the minimum stocking standard, they will vary as well. So, in this case, the objective stocking standard is the one that varies the most.

Variations of objective standards reflect different renewal methods and expected higher levels of success with greater levels of investment. For example, if you were to look at those regional free to grow standards, benchmark standards that were submitted in the Panel 4 witness statement, you will note that for tree planting the objective stocking standard may vary from 60 to 80 per cent depending on what region you are in.

For seeding, the standard may vary from 40 to 50 per cent and to put that in context of natural regeneration, the objective stocking standard is

usually 40 per cent.

MS. BLASTORAH: The next overhead, which will be Exhibit 552E, is titled Results.

---EXHIBIT NO. 552E: Slide entitled: Results, Stocking Information.

MR. WAITO: These are the results of the stocking information that was provided. 16,811 hectares were surveyed. 83 per cent of the area surveyed met the minimum stocking standard, and that's the minimum of 40 per cent.

There is one exception in there and that is Minden. There is always one exception, and that was with respect to the stocking standard for white pine. Mr. Hynard informs me that his minimum standard for white pine is 30 per cent. So, in that case, everything 30 per cent and above was included.

For the conifer working groups, 76 per cent of the area which received an artificial regeneration treatment was equal to or greater than the 40 per cent stocking -- minimum stocking standard, and 87 per cent of the area which received -- that was naturally regenerated was greater than 40 per cent stocking.

MS. BLASTORAH: Q. Perhaps just before you go on to the hardwork groups, Mr. Waito. Mr.

Hynard, could I just ask you to explain why you set your stocking objective at 30 per cent? I believe it was the objective; was it?

MR. HYNARD: A. The minimum was set at 30 per cent.

Q. The minimum, I beg your pardon.

A. Well, there are three reasons for that. First of all, this applies to the site type that I described to you this morning with respect to white pine.

That's a very rough, rugged piece of ground, very stoney, the site type that I described to you. In that case, 30 per cent stocking is adequate stocking to produce another stand of the white pine working group and, after all, that is our objective, is to produce a stand of that working group.

Secondly, 30 per cent stocking is adequate stocking to produce another commercial crop of pine. And the third reason is that, given the nature of the site, that is about as good as we can expect to attain under those conditions. And seeing how we will produce a white pine stand with a commercial crop of pine, I set those standards at that level.

Q. Thank you.

MR. WAITO: A. Of course, for the

hardwood working groups, these would include poplar and hard maple, white birch, there is no artificial regeneration work carried out in those. 96 per cent of the area that regenerated naturally met the minimum 40 per cent stocking level.

Q. Perhaps for the record we should just indicate that the title of that overhead should probably be Results, Stocking Information.

MR. WAITO: A. That's correct.

Q. The next exhibit, which will be 552F, is titled: Message. Perhaps we should put a subheading on that as well, Mr. Waito?

A. This is the message for the stocking information.

MS. BLASTORAH: So the title will be -- on the record will be: Message, Stocking Information.

---EXHIBIT NO. 552F: Slide entitled: Message, Stocking Information.

MR. WAITO: Again, we looked at both artificial and natural and hardwood and conifer. And I took the liberty of calling 76 per cent for artificial regeneration as representing good results, to be noted that the results are based on practices and technology of the mid-70s to the mid-1980s and that as a professional forester I would expect the 76 per cent to

increase in the late 1980s due to improved technology and improved practices.

For natural regeneration, I think that 87 per cent of the area meeting the minimum stock requirement represents good results for conifer working groups. 96 per cent represents very good results for the hardwood working group, and I think it supports the point that Mr. Hynard made about hardwood working groups regenerating successfully, naturally, to the appropriate species.

I think the overall message for natural regeneration is that high quality natural regeneration can be achieved on certain sites.

MS. BLASTORAH: The next overhead, which will be Exhibit 552G, is titled: Free to Grow (FTG).

---EXHIBIT NO. 552G: Slide entitled: Free to Grow (FTG).

MR. WAITO: The third -- a piece of information that we received, of course, was on free to grow which is a new -- relatively new concept. It came into being with the FMAs and with the forest management agreement program and is now part of the Crown management unit program as well.

22,186 hectares were surveyed. 81 per cent of the area met the free to grow standards at the

time of the survey.

For the conifer working groups, 69 per cent of the area treated artifically was free to grow and 71 per cent of the area treated naturally was free to grow. For hardwood working groups, of course, there was no artificial regeneration work done for hardwoods, and 85 per cent of the naturally regenerated was free to grow.

Now, falling out of that, the reasons for not being free to grow relate back to the three standards; the stands do not meet a minimum stocking standard, stands that were surveyed did not meet a minimum height requirement, and stands may not be free from competition.

MR. MARTEL: If the 69 per cent of the area treated artificially is free to grow, why for the sake of two per cent would you treat?

MS. BLASTORAH: Perhaps if I could just rephrase your question slightly, Mr. Martel.

Q. In the areas that were treated artificially, would those areas necessarily come back to satisfactory regeneration if they were left to regenerate naturally?

MR. WAITO: A. They may not have been free to grow. The fact that they were treated is an

indication that the treatment resulted in a level of conifer stocking that would have contributed to that first requirement of meeting a minimum stocking per cent.

It is not really possible to compare the 69 per cent and the 71 per cent because they are on different site types and they are on different areas.

Q. So am I -- would site types that would not be appropriate for the natural be included in the areas that are included in the 69 per cent artificially treated?

A. Say that again?

Q. Perhaps I can rephrase that. The 69 per cent of the area -- or the 69 per cent free to grow, that area that was treated artificially, would those site types all be equally appropriate for either artificial or natural or would there be included in there some site types that would be inappropriate for natural?

A. There would be areas that would be inappropriate for natural. There may have been an area that was treated artificially that may very well -- may have regenerated naturally and met minimum standard and, as well, there are areas that are regenerated naturally that had they have been treated artificially

would have met the minimum.

The thing is, you can't compare the two areas because they are on different sites and they are different areas.

Q. Thank you.

MS. BLASTORAH: Does that answer your question, Mr. Martel?

MR. MARTEL: Yes.

MR. WAITO: My final overhead, I guess, is the message that I get out of the free to grow information. So it's message on free to grow.

MS. BLASTORAH: And that will be Exhibit 552H.

---EXHIBIT NO. 552H: Slide entitled: Message on Free to Grow.

MR. WAITO: I've described free to grow success of 70 per cent for conifer working groups as a fair result. I have described free to grow success of 85 per cent for hardwood working groups as a good result.

I think the underlying message is that we need to increase the amount of area that meets a minimum stocking standard for conifer species. We need to ensure that areas regenerating to conifer species, be they artificial or natural, are kept free to grow by

tending when required. We must evaluate our results and adapt silvicultural groundrules and practices to improve the level of success.

And the final point, technology and practices have changed and improved in the past 10 years, and I believe should result in an improved level of success in the future. And I think one last comment, the information here might be viewed to a certain extent in comparison to SOARS 1 and 2, and I believe we are going to file SOARS 2 at this time; is that correct?

MS. BLASTORAH: Yes, that's correct. SOARS 2 is kind of a colloquial expression we have picked up just to distinguish it from the SOARS Report that's already been filed.

The proper title is: Survey of Artificial Regeneration in Northern Ontario, Summary Report for Northeastern and Algonquin Regions Based on Field Sampling 1987 to 1988.

And we had undertaken at the time the earlier SOARS Report was filed to provide this when it became available, so I would like to do that at this time.

THE CHAIRMAN: Exhibit 553.

MS. BLASTORAH: And I do have copies of

this for everyone.

---EXHIBIT NO. 553: Document entitled: Survey of Artificial Regeneration in Northern Ontario, Summary Report for Northeastern and Algonquin Regions Based on Field Sampling 1987 to 1988.

MS. BLASTORAH: Perhaps while Mr. Freidin is handing these out, I think Mr. Hynard wanted to add something to what Mr. Waito has just been telling us.

MR. HYNARD: With respect to your question, Mr. Martel, which was the question of comparison been natural and artificial methods and how they appeared virtually the same or the natural methods in fact showed higher stocking levels overall.

You will recall in my evidence this morning that I said that natural methods were limited by site type, and I presume that these natural methods shown here were conducted on those site types and they showed a good success rate.

Those same natural methods for preferred conifer species if conducted on tougher sites, those tricky sites that I described, would produce absolutely dismal results. And so that's the reason that they can't be directly compared.

MR. MARTEL: Thank you.

MS. BLASTORAH: Thank you, Mr. Hynard.

MR. WAITO: With respect to SOARS 2, I just have a couple of comments to make. The information pertains to the northeastern and the Algonquin regions.

The conclusions and observations were similar to those in SOARS 1 and I believe there has been considerable discussion about SOARS 1 by Mr. Armson in earlier panels.

Approximately the same percentage of the area planted or seeded did not meet the density or free to grow standards to be included in the MAD calculation. This is the same as in SOARS 1, and there were some differences, broad differences.

SOARS 2 included data on red and white pine plantations, whereas SOARS 1 did not. In SOARS 2 the areas surveyed were preceding -- pre-1972 and <*R> for plants pre-1977 and for SOARS 1 the areas surveyed were pre-1970 for seeding and 1975 for planting.

MRS. KOVEN: Excuse me, I would like to make a comment.

We haven't seen a lot of this information since Panel 4. There has been a long interlude with some of this stuff and it is not that simple to follow because we've had a space of almost a year and certainly we weren't prepared for the introduction of

this kind of oral evidence from the written material in Mr. Waito's witness statement. There's a small paragraph about the stocking and so forth.

I think it might be helpful that in another panel we might be given a bit of warning before the panel begins, because we might want to refresh our memories.

MS. BLASTORAH: Mrs. Koven, are you talking about the SOARS Report or just the stocking?

MRS. KOVEN: I am talking about the stocking survival and free to grow material as well as the SOARS material.

MS. BLASTORAH: Okay. I certainly will take that into account in preparing any future evidence. We are aren't going to be going into the SOARS Report at all, so we had undertaken previously, as I indicated, to file it and that's all I intended do do now.

Mr. Waito has just indicated what the differences are so that it can be distinguished and interpreted by yourselves appropriately, but we certainly aren't going to got into it and I think the only reason we went through this little exercise of talking about stocking was because we wanted to file the interrogatory.

And basically I thik the point to be made was, as Mr. Waito said, that if these numbers are to be looked at, stocking figures, you have to appreciate that certain things have to be known in interpeting them and, basically, that was the point that we wanted to make here and we aren't going to go into stocking anymore.

MRS. KOVEN: I would just appreciate a little warning the next time.

MS. SWENARCHUK: Mr. Chairman, I would like to second that comment. With respect to the SOARS Report, obviously again this is a matter that has to go to our experts for analysis and I would have appreciated this report having been filed with a little more notice, if we could have that done.

THE CHAIRMAN: Is not the case though, Ms. Swenarchuk, that this report just became available?

MS. BLASTORAH: I am advised it became available about two weeks ago and, as I indicated, we were asked by the Board to file it.

THE CHAIRMAN: This particular report?

MS. SWENARCHUK: Fair enough. Could I just ask then, in terms of cross-examination, is it this panel to which we direct questions, or is it the Ministry's intention to recall Mr. Osborn or what is

the plan?

MS. BLASTORAH: Well, Mr. Chairman, I would point out that we dealt with that kind of information in Panel 4 I believe it was Dr. -- or Mr. Armson spoke to it and, as you may recall, I know it's some time ago, the report deals with results that are quite old at this point in time and really are not reflective of anything related to the new timber management planning procedures and the activities and not necessarily related very closely to the types of renewal activities that are going on now.

And that material was presented in part because there was seen to be some lack of information available on past results, so that was put forward as something that we had. Again, the reason we are filing this now is not because we particularly want to go into it or think it is of any particular use to the Board in terms of what's going on on the ground now, but simply because we were asked to file it and we were putting that forward for what it's worth.

I don't know how the Board will view it, but we would make those comments. I don't know that anyone on this panel is in a position to comment on it, except very generally and, frankly, I don't know what the value of going into it in any detail would be at

this point in time.

THE CHAIRMAN: Well, Ms. Swenarchuk, there is some difficulties as well in this context, that any of the parties leading evidence have no idea what interrogatories are going to be asked and when interrogatories are asked that require further studies, further information the answers may be provided but it may relate in some instances to evidence given by a witness in a previous panel.

MS. SWENARCHUK: Mr. Chairman, I have no -- I am not saying anything about the provision of the interrogatory results. I am merely speaking if the answer to the question is: We don't have a witness to cross-examine on the SOARS Report, that's fine, that is the answer to the question.

In terms of currency of results, however, on cursory glance I see it's as recent as 1985 and might I point out, you are going to hear from us in our cross-examination that in our view one of the most important elements of course on the question of regeneration is whether it's working or not.

THE CHAIRMAN: Right.

MS. SWENARCHUK: And what data there is to indicate that. So, you know, as I say I simply want to answer the question. If no witness is going to be

provided for cross-examination, fine, I will go with that.

MS. BLASTORAH: Mr. Chairman, I certainly didn't mean to imply that we were saying that these witnesses could not be cross-examined on this report. I was merely indicating that there was certainly no one on this panel with the level of expertise of Mr. Armson.

Mr. Waito has advised me that he's read the report and he is generally familiar with it and I believe he can comment generally on how these conclusions relate to what resigned the other SOARS Report that was filed previously.

Perhaps he could give us a very brief comment as to --

THE CHAIRMAN: No. I think the question I'm trying to deal with, Ms. Blastorah, is the problem we may get into with a recalling of witnesses and it may well be that you can put whatever questions you want to this panel and anyone can cross-examine this panel to the extent that they can answer some of these questions, say, related to this report. It may be that the proponent in reply may wish to canvass the idea of going into it in more detail in terms of what arose out of the cross-examination or, in terms of the

proponent's opportunity at the end of hearing the opposition's case, may wish to deal with it at that time as well.

MS. BLASTORAH: And, Mr. Chairman, I would certainly also like to indicate that this panel is here to be cross-examined on renewal and to the extent that that relates to past results, I certainly did not intend to imply in any way that they could not be questioned on that.

My comments were directed specifically to the SOARS Report itself and the fact that we don't have a Mr. Armson on this panel, but I'm not attempting to limit questions on past results.

THE CHAIRMAN: Okay.

MS. BLASTORAH: And, Mrs. Koven, certainly we will take your comments into account in future.

Q. Mr. Waito, I haven't forgotten about you. Moving on to a related if slightly new area, does the Ministry of Natural Resources have any system to assist the unit forester in accessing detailed silvicultural information which will assist him in the planning, delivery and evaluation of the Ministry's silvicultural program at the local level?

MR. WAITO: A. Yes, we do. Information

on past results, for that matter on silvicultural projects, is kept at the management unit level and is filed in the silvicultural information system or SIS. I believe we've heard a little bit about SIS from Mr. Gordon in Panel 4.

The silvicultural -- let me start over. Systems to record silvicultural information have been in place for at least the past 25 years and the current silvicultural information system has evolved from these as the amount of information to be recorded has increased and as technology has changed over the years.

In the past, the basic record was a paper one - this is recent past I'm speaking of too - consisting of cards completed at the management unit level and filed in a filing cabinet. These cards recorded project description information such as location, site description, project description and results based on survival or stocking surveys.

Now, completed silvicultural records or cards are sent to Toronto each year where the information from the cards is loaded into a central computer. This information was then collated to provide data on area planted, area tended, trees planted, et cetera, for use in the preparation of the Ministry's annual statistics report.

And the computer software used for this purpose did not and does still not lend itself to use for the production of other data sorts. And, of course, the whole system itself is not easily access ible to the field. The central computer is located in Toronto and I believe the programming language is fairly old, the FORTRAN language.

Q. Mr. Waito, could you explain what you mean by data sorts?

A. Well, as opposed to sorts of data, data sorts are -- it's the term that I use to describe how the computer would sort out data based on a particular parameter you would be interested in., for instance, sorting out and giving you a total number of trees planted in the province for one year would be the result of a data sort.

You may sort the data, have the computer sort the data to produce a summary of how many hectares were planted. You may sort the data to produce a tally of how many projects were undertaken that year.

So that's a data sort and that's different from sorts of data; sorts of data are kinds of data. So that's what I mean by data sorts.

Q. Thank you.

A. With the advent of personal

micro-computers, the door was opened to equip each district with the hardware and the software capability to store and manage this information at the local level.

Districts purchased their hardware, I believe, in 1987 and the software was being programmed to provide a user friendly easy entry format for distric t staff. It was hoped that this system would be complete and operational by 1989, however, we are having some technical problems with the software.

THE CHAIRMAN: So is the Board with our own computer system.

MR. WAITO: I can understand. We're having some technical problems with the software. It appears as though we can input all the data, but we can't produce any data sorts and, therefore, produce some reports. So it's not fully operational.

THE CHAIRMAN: It all goes in but nothing comes out?

MR. WAITO: That's right. That's not unlike Toronto as before anyway.

I want to emphasize that the information which is input into this computerized silvicultural information system uses a series of standard formats and it doesn't differ significantly in quality and

quantity or type from what was recorded in the past on paper and stored in filing cabinets.

The computer silvicultural information system can be used to sort this data. It was not designed nor intended to analyse data. The results of these computer data sorts could be used for analytical purposes by a person familiar with the conditions to which the data applies or relates.

The analysis of the data must be done by the forester or the forest technician; it cannot be done by the system.

MS. BLASTORAH: Q. Mr. Waito, are quantitative assessment results important?

MR. WAITO: A. I believe they are. They are valuable and important at the local management unit level and they certainly valuable and important at the provincial level.

Q. Why do you say that?

A. Well, at the local level - and I spent a little bit of time describing the kind of local level information that can be gathered - they help the forester to quantify what he or she observes in the field and this, in turn, can help provide for a better understanding of the results of a treatment. And, as public servants - this is something I strongly believe

in - that we are accountable to the public for what we do. And I believe that some quantifiable measure of the results of our renewal efforts is necessary in order to provide that accounting to the public.

Now, understanding and reporting results to the general public in a manner that reflects reality, at the same time means something to the public, is a difficult task. If you were describe stocking to someone who didn't understand what stocking was, he might think you were talking about nylons.

I'm a firm believer that for every complex question there is a simple, easy to understand wrong answer and that's something we want to avoid, giving wrong answers. And I'm sure the Board can appreciate how difficult this task is, given we've spent almost a year I guess so far attempting to explain what we do.

We do recognize the need for public accountability and we're working on it. And I believe evidence which will address this particular issue will be presented in Panel 16.

And that's my evidence.

MS. BLASTORAH: Mr. Chairman, this would be a convenient point to break for the day.

THE CHAIRMAN: Very well. We'll adjourn

until 8:30 tomorrow and we'll plan to sit to the regular time tomorrow, one o'clock or so.

MS. BLASTORAH: Thank you, Mr. Chairman.

THE CHAIRMAN: Thank you.

---Whereupon the hearing adjourned at 4:55 p.m., to be reconvened on Thursday, May 4th, 1989, commencing at 8:30 a.m.

E R R A T A

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